Proseminar Sommersemester 2016

Research questions

In an age where interacting with computers does not just mean a PC or laptop but a robot, hologram or even in virtual reality, we want to explore privacy & trust considerations this progress adjoins.

Levels of interaction

	Robot	3D Projections – Hologram (Augmented Reality)	Virtual Reality	PC/Mobile Phone
Separation between real and virtual space	Yes	No	Yes	Yes
Multitasking possible (i.e. reading book while engaging with computer)	yes	yes	no	yes
Language	Haptic Gaze Touch Audio Gesture Face Expression Body position	Visual Gaze Gesture	Gaze Gesture Visual Face Expression Body position	Gesture Visual Touch Audio Haptic

Let us explore these interaction tools and their limitations.

HRI

Human Robot Interaction as a research area has increased in popularity over the past years, even leading to designated conferences on this topic. One factor that leads to this is the fact that this area in HCI combines a multitude of sciences: Psychology, Social, Machine Learning, Cognitive Sciences.

1. What defines a robot in the area of HRI? How has HRI advanced in the last 5 years? Based on this research, discuss what the most challenging questions are when it comes to designing a robot? #robot history #challenges in HRI
   Hancock, P.A., Billings, D.R. and Schaefer, K.E., 2011. Can you trust your robot? Ergonomics in Design: The Quarterly of Human Factors Applications, 19(3), pp.24-29.s

2. Robots can interact with humans through different channels. One of them being spoken and written language. Discuss how important language is in communicating with a robot and what the process is to make it more human like.
   #LoeberPrize #TuringTest #
   Dill, K.E. and Burgess, M.C., 2012. Seeing is believing: Toward a theory of media imagery and social learning. The psychology of entertainment media: Blurring the lines between entertainment and persuasion, p.195.

3. Robots can be designed machine-like and humanoid. Discuss how much humanness in robots humans prefer. Does the preference change depending on the usage of the robot?
   Strait, M., Vujovic, L., Floerke, V., Scheutz, M. and Urry, H., 2015, April. Too Much Humanness for Human-Robot Interaction: Exposure to Highly Humanlike Robots Elicits Aversive Responding in Observers. In Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (pp. 3593-3602). ACM.

4. In general, the aim of AI and research in robots is to develop a self-sufficient being. This means that they learn in a similar way as humans do. How does a robot “learn” new things? How does their memory differ from a human? Discuss whether humans can win against AI systems.
   Young, M.K., Rieser, J.J. and Bodenheimer, B., 2015, September. Dyadic interactions with avatars in immersive virtual environments: high fiving. In Proceedings of the ACM SIGGRAPH Symposium on Applied Perception (pp. 119-126). ACM.

5. Understanding users' perception of privacy in human-robot interaction.
   Privacy issues need to be considered if we want to depend and live alongside robots. Considering how fast research is developing in the area of HRI, discuss the privacy issues in HRI. Is it possible to adapt known privacy improvements from HCI to HRI?
   Schaefer, K.E., Billings, D.R., Szalma, J.L., Adams, J.K., Sanders, T.L., Chen, J.Y. and Hancock, P.A., 2014. A Meta-Analysis of Factors Influencing the Development of Trust in Automation: Implications for Human-Robot Interaction (No. ARL-TR-6984). ARMY RESEARCH LAB ABERDEEN PROVING GROUND MD HUMAN RESEARCH AND ENGINEERING DIRECTORATE.

General AI systems

6. Between humans, we assume there is a general ethical guideline that we all follow and laws to adhere to. Is it possible to teach a robot, hologram or any other AI system to behave in a similar way instead of bearing all the responsibility of privacy by ourselves as the user?

   H Anderson, S.L., 2011. How machines might help us achieve breakthroughs in ethical theory and inspire us to behave better. Machine ethics, pp.151-160.

7. Gesture is another way to interact with AI systems. However, gestures can be very subtle and difficult to interpret. Discuss how humans already interact with computers through gesture and how these gesture can be adapted to human robot interaction.
   Baddoura, R. and Venture, G., 2015. This Robot is Sociable: Close-up on the Gestures and Measured Motion of a Human Responding to a Proactive Robot. International Journal of Social Robotics, 7(4), pp.489-496.

8. Gesture is also a form of interaction when using head mounted displays. Discuss the challenges research faces by adapting gesture for head mounted displays.
   Colaço, A., Kirmani, A., Yang, H.S., Gong, N.W., Schmandt, C. and Goyal, V.K., 2013, October. Mime: compact, low power 3D gesture sensing for interaction with head mounted displays. In Proceedings of the 26th annual ACM symposium on User interface software and technology (pp. 227-236). ACM.

9. In what formats does a robot interact with a human? How does adapting gaze in robots increase the relationship between human and robot? #haptic feedback #eye gazing
   Andrist, S., Mutlu, B. and Tapus, A., 2015, April. Look Like Me: Matching Robot Personality via Gaze to Increase Motivation. In Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (pp. 3603-3612). ACM.

10. Robots have long been in use in factories but recently also in private households. What are the effects of working along-side robots? As designers, what do we need to pay attention to?
    Sauppé, A. and Mutlu, B., 2015, April. The social impact of a robot co-worker in industrial settings. In Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (pp. 3613-3622). ACM.

Virtual and augmented reality

11. What is virtual reality? What were its beginnings and where are we today? Discuss the commercialization of virtual riality.
    Mark Mine. 2003. Towards Virtual Reality for the Masses: 10 Years of Research at Disney's VR Studio, Walt Disney Internet Group, VR Studio, Glendale, CA, USA

12. What is a HMD based virtual reality system? Obviously it needs hardware, like the HMD and the computer. What are the most important manifestations of the single subsystems according to this definition? Based on the research, please discuss, what would be the most promising combination of subsystems for a multi-user interaction game.
    Keywords: virtual reality systems, head mounted display, immersive environments Blade, R.A. and Padgett, M.L., 2002. Virtual environments standards and terminology. Handbook of virtual environments, pp.15-27.

13. Head mounted displays are part of pop culture currently although scientifically they have been researched for a multitude of years. What are the usability challenges that we have found in research so far? Are they being addressed currently and if so how?
Mark McGill, Daniel Boland, Roderick Murray-Smith, and Stephen Brewster. 2015. A Dose of Reality: Overcoming Usability Challenges in VR Head-Mounted Displays. In Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (CHI '15). ACM, New York, NY, USA

14. In order for virtual reality to be more realistic, it has to not only advance in the quality of what we see but also stimulate our senses. What is required in order to simulate warmth and wind? Is it a more immersive experience when other senses than the sense of seeing is stimulated? What is a CAVE system?
Felix Hülsmann, Julia Fröhlich, Nikita Mattar, and Ipke Wachsmuth. 2014. Wind and warmth in virtual reality: implementation and evaluation. In Proceedings of the 2014 Virtual Reality International Conference (VRIC '14). ACM, New York, NY, USA, , Article 24 , 8 pages

Virtual and augmented reality has mainly gained popularity through the effect it may have in the gaming world. However, there are many other areas where virtual reality is being used.

15. How can augmented reality be leveraged as another input method for mobile phones? Is it more effective than the user interactions that we are aware of at the moment? Discuss the potential this new input method has and how it can be used in practise.
Bai, H., Lee, G.A., Ramakrishnan, M. and Billinghurst, M., 2014, November. 3D gesture interaction for handheld augmented reality. In SIGGRAPH Asia 2014 Mobile Graphics and Interactive Applications (p. 7). ACM.

16. What defines an assistive technology? How effective are these systems based on the example in mentioned paper? Discuss the acceptance rate and trust in the virtual system from the patient as part of your answer.
Diane Gromala, Xin Tong, Amber Choo, Mehdi Karamnejad, and Chris D. Shaw. 2015. The Virtual Meditative Walk: Virtual Reality Therapy for Chronic Pain Management. In Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (CHI '15). ACM, New York, NY, USA, 521-524.

17. So far we have seen multiple examples of VR and AR systems that improve certain situations in the real world. However, as some of you may have noticed, the majority of the opportunities are for single-users. Collaborating in virtual reality and enabling remote collaboration would be an important progress in this field.
Shunichi Kasahara, Valentin Heun, Austin S. Lee, and Hiroshi Ishii. 2012. Second surface: multi-user spatial collaboration system based on augmented reality. In SIGGRAPH Asia 2012 Emerging Technologies (SA '12). ACM, New York, NY, USA, Article 20 , 4 pages.

18. Collaboration in virtual and augmented reality also brings to light that information may need to be shared publicly. How can collaboration be enabled whilst differentiating between private and public space? Does private and public space go hand in hand with private and public information? Discuss the necessity of having a private space in virtual and augmented reality.
Suzanne Mueller, Andreas Dippon, and Gudrun Klinker. 2015. Capture The Flag: Engaging In A Multi-Device Augmented Reality Game. In Proceedings of the 2015 International Conference on Interactive Tabletops & Surfaces (ITS '15). ACM, New York, NY, USA, 277-282.

19. Creating trust between avatars in virtual reality is an important factor for building relationships that foster collaboration. Body language in virtual reality, specifically eye contact is an important factor that influences successful communication and therefore the building of trust.
    Why are pupillary responses an important factor in creating a realistic avatar? What other factors correlate to designing a successful realistic human avatar? Discuss the design considerations for creating successful pupillary responses in avatars. How may these human avatars be applied in practise?
    Myoung Ju Won, Sangin Park, SungTeac Hwang, and Mincheol Whang. 2015. Development of Realistic Digital Expression of Human Avatars through Pupillary Responses based on Heart Rate. In Proceedings of the 33rd Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA '15). ACM, New York, NY, USA, 287-290

20. Is it necessary to have an avatar in the virtual world or does it suffice to show the movement of your arms/hands? Discuss the advantages of having a representation of the player (actor) in the virtual world. Do players have to be collocated in order to interact in such a way that they can high five or even shake hands at the beginning of a virtual meeting?
    Young, M.K., Rieser, J.J. and Bodenheimer, B., 2015, September. Dyadic interactions with avatars in immersive virtual environments: high fiving. In Proceedings of the ACM SIGGRAPH Symposium on Applied Perception (pp. 119-126). ACM.