Vision

The CHCI will excel in cross-disciplinary research on interactive computing that extends into the everyday life of individuals, groups, and societies. Our vision is to lead national and global research and education by defining future interactions among people, information, and technology with a focus on both the ubiquity and the connectedness of computing devices. The center’s research is applied to multiple real-world problem domains including education, decision-making, e-commerce, and international development, treating each as constituting sociotechnical ecologies.

Mission

CHCI will advance Virginia Tech’s world-class strength in understanding and designing the human use of computing as it extends into (1) better use of new and existing devices and (2) the systems that people must now manage in everyday life and practice.

Technical Approach

CHCI excels in cross-disciplinary research on interactive computing that extends into the everyday life of individuals, groups, and societies. We categorize this research under four major headings:

• Visual Interactive Communications
• Ecologies of Displays and Devices
• Social Collaborative Computing
• Data, Information, and Knowledge
Visual Interactive Communication

CHCI’s strengths span visualization/interaction spaces that include super-high-resolution wall-scale displays, high-resolution horizontal displays, virtual-reality (including CAVE Automatic Virtual Environment-type interaction and head-mounted systems), augmented reality (including see-through head-mounted displays and hand-held systems), spatialization and sonification of complex information, and mobile devices (such as PDAs and smartphones). Our expertise is not so much in the hardware construction of such display/interaction systems as it is in the software that drive these systems and in the deployment of and interaction with these systems. Our work in large high-resolution displays, for example, has focused on the interaction with these displays that can support greater insight formation by intelligence analysts. We have studied how various scales of horizontal displays, coupled with interaction with handheld devices, can help students derive better and deeper understanding of seemingly disconnected information that is of varying certainty and unknown usefulness. We have investigated how handheld devices may support classroom discussion and brainstorming.

Our interests extend from interaction with each of these technologies to how they may function together to support broader human action and interaction. The power of handhelds, for example, may be more fully realized as they function within ecologies of interaction systems to support collaborating teams. In this context CHCI’s research expertise and capabilities in interacting in three-dimension spaces, human tracking and behavior analysis, and location-based interaction have immediate application.

These technologies, in conjunction with relevant theoretical foundations, permit us to address a variety of challenges in decision support, situation awareness, and the design of new work and command environments.

Ecologies of Displays and Devices

The combination of a cell phone and a camera has changed the way people gather and disseminate news, the way they shop, and the way they remember things. While the separate pieces may have previously existed, the combination itself is innovative. This innovation becomes part of a larger media ecology intertwined with the Internet. CHCI’s investigations are to explore this space, not focusing on any one particular technology, but the combination of new and existing technologies, their usability, and their impact. Thus we look at mobile technologies, small and large displays, and infrastructures, whether they are technologies for the domestic realm, for people with cognitive impairments, or for the learning, work, or command space.

CHCI has a long track record in usability engineering and testing which involves the collection and analysis of mission/task requirements, informed design of the system and interface, and rigorous testing of the effectiveness of the resulting system. Our research integrates usability engineering with the overall software engineering process to develop systems that reduce errors and enhance efficiency and experience.

Social Collaborative Computing

Social collaborative computing research pertains to information technology designed specifically for social purposes, such as interpersonal and group communication, discussion, and social interaction. It also investigates user requirements, current use, and social effects of computing. It draws not only on computer science, but also on sociology, psychology, and political science. Social collaborative computing relates to communication through the study of communication behavior (e.g., online deliberation and social interaction, technology uses, and gratifications) and communication effects (e.g., changes in civic engagement, social ties). It relates to cognition in terms of psychological capacities, such as efficacy, situated awareness and social context of learning and training. In the area of cognitive response training, for example, we are investigating the use of data-driven situational simulations to train trauma-room physicians in making time-pressured and mission-critical decisions that affect a patient’s survival. These simulations may be implemented on a desktop or immersive virtual reality interfaces. Our research in distance tutoring, as well, may be readily applied to training shipboard personnel in mission-related mathematics and technical skills.

Data, Information and Knowledge

How do people generate, store, access, and (re)use content supporting individuals, groups, communities, and societies? This research provides the foundation for information science, information technology, and information management (from the personal to the global, connecting with the WWW, search engines, social networks, and digital government). From exploring personalization and contextualization that supports education or health, to “big data” that supports research in science, engineering, and the humanities, we focus on how to improve interaction with content. Our work ranges from establishing integrative foundations and building systems, to user studies and applications (e.g., to help communities manage crises, tragedies, and recovery). In collaboration with the undergraduate track in computer science on knowledge, information, and data, and related to graduate courses in artificial intelligence, database management, data mining, digital libraries, information storage and retrieval, and other specialties, a broad range of CHCI research focuses on data, information, and knowledge.