

# A Conversation with CHCCS 2021 Achievement Award Winner Pourang Irani

Pourang Irani

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## ABSTRACT

The 2022 CHCCS Achievement Award from the Canadian Human Computer Communications Society is presented to Professor Pourang Irani (UBC Okanagan) for his impact to the field of human-computer interaction. His research interests sit at the cross-section of MobileHCI and Information Visualization, and lately include the design and evaluation of in-situ user interfaces for improve sense-making. CHCCS invites a publication by the award winner to be included in the proceedings, and this year we continue the tradition of an interview format rather than a formal paper. This permits a casual discussion of the research areas, insights, and contributions of the award winner. What follows is an edited transcript of a conversation between Pourang Irani and Xing-Dong (Associate Professor at Simon Fraser University) that took place on April 20<sup>th</sup>, 2022.

## THE INTERVIEW

**Xing-Dong:** Some of our audience have heard that you recently moved to UBCO after nearly twenty years at the University of Manitoba. Congratulations! Shall we start by talking about your move and your new role at UBCO?

**Pourang:** Thank you Xing-Dong for carrying out this interview and the congratulatory note. I am honoured to have been selected for this award which took me by surprise. Yes indeed, I relocated to British Columbia last Fall and formally joined UBC (Okanagan) in January 2022 after 19 years at the University of Manitoba. I consider myself very fortunate to have started my career at the UofM and miss dearly the many great friends and colleagues there. I am still new in BC, and I am looking forward to making new friendships and meeting colleagues as I hope Covid-19 restrictions soon get lifted.

**Xing-Dong:** That's great to know. I think lots of us in the audience know you through your research in Human-Computer Interaction (HCI) and information visualization, but I imagine that few know your origin story. Can you tell us how you first become interested in these areas?

**Pourang:** Sure, I am glad to share some of that background. I think much of how I wound up in this field or even at the UofM was by mere serendipity. As a senior undergraduate student, I enrolled in a graduate level course at the University of New Brunswick (UNB) taught by Colin Ware, on the topic of Information Visualization. At the time, Colin was drafting his seminal textbook on the application of Perception to the design of Information Visualization [28], and as students we were quickly exposed to the many empirical and design aspects of data visualizations. Colin also gave us significant freedom in our course project to explore topics on representing node-link diagrams in 3D, an area he was pioneering at the time. It was the first time I ever encountered the idea of representing abstract concepts using visually aesthetic formats. I was enthralled by the

many possibilities that we were exposed to and I was immediately attracted to the value of translating theories of perception into design principles for visually displaying data and information. The notion of presenting data using visual marks that highlighted hidden structures in meaningful and legible ways was alluring. The course was ultimately a turning point as I then decided to pursue graduate studies in this area under Colin Ware's supervision instead of pursuing a career in industry (I had an offer at the IBM lab in Toronto, but an NSERC PGS award along with Colin's support made it possible for me to pursue the MSc at UNB). At the time, research in Colin's lab focused on ways of representing node-link graphs in 3D [30], exploring stereoscopic displays and VR [29] and cognitive dimensions of graph aesthetics [31]. Upon joining Colin's lab, I was directed to understand and apply theories of object recognition by Marr & Nishihara [18] and subsequently Biederman's work on recognition by components and geometric ions (geons) [2] to visualize software structures. I developed toolkits to facilitate drawing geon-diagrams [14] and applied these theories to represent software class semantics, such as those we see in UML (Unified Modeling Language) diagrams [16]. In the midst of my MSc, Colin offered the opportunity to convert my research over to the PhD program and after a couple of years I took on my first academic position at the UofM.

When I joined the UofM as an early career researcher (ECR), my role was to launch a program in HCI, including multiple course offerings in our department. I am entering this new position at UBCO as a senior member of our department and my role might also include providing mentorship opportunities to new faculty as well as helping the department and faculty with their goals.

**Xing-Dong:** What's fascinating is the intersection of your work in HCI and information visualization. I wonder if there are any thoughts you have about the grand challenge that is shared between these two areas and how do you see us as a community to go about addressing the challenge?

**Pourang:** This is a great question but I don't know if I can come up with that set of moonshot projects that would be shared with both, as we commonly expect in any single major research field. I feel that both disciplines have evolved extremely well at advancing new human-centered tools and technologies. If we look at the basics at how both communities have developed, you observe that they share the common goal of having technology serve the purposes of an end-user through a number of processes, both human and systems-oriented. From this very broad perspective, I can see some challenges shared commonly among both, HCI and Infovis, in areas of: (a) methodology; (b) knowledge translation; and (c) perceived identity. In terms of methodologies, they both involve very creative interdisciplinary processes, are design focused and necessarily seek validation from end-users and those who may ultimately benefit from our progress. Here, I feel there is tremendous work needed for developing and refining methods for harnessing the creative

potentials of practitioners and designers, for optimizing design practices and for assessing our outcomes. Both disciplines have borrowed immensely from other well established fields, such as psychology, ethnography, sociology, biomechanics and design. But there are new opportunities to devise our own unique set of methodologies. For example, I have recently been interested in computational interaction [19] for advancing design processes and look forward to applying such approaches in our own work. In terms of developing new methodologies, I believe we can be more forgiving in our own discipline to accept lesser polished works, but that may rank very highly on the innovation bar.

A second set of challenges, which goes beyond what we see occurring in other fields such as Machine Learning, Computer Vision or AI communities, is to find ways to translate our findings into mainstream tools and technologies for everyday consumers. Translation often remains in the purview of industry, but as an applied field involving a human-centered element, I believe that we can and should play a central role in shaping how such translation occurs with concerted efforts about the social, environmental and even political ramifications. We need to consider the role of HCI and Infovis even more critically in helping shape policies [8],[26] and ways to impact society in newly informed ways. We can play a critical role in how our technologies are applied and with some foresight, we should play a role in guiding decision makers and government agencies alongside our drive to introduce novel platforms, devices or systems. For example, socially acceptability techniques only consider the immediate, visible effects of introducing foreign technologies into society. In our lab, we are considering new methods for social acceptability that go beyond the immediate 'perceivable' acceptability, but also which consider the safety and social implications of embedding our new technologies such that we may inform policies around these. For instance, I am not aware of any HCI rooted policies alongside the introduction of touchscreens in cars.

Finally, I can say that we may still need to continue improving our perceived identity. I feel as HCI and/or Infovis researchers, we may have a clear sense of the values we add to the proposal and development of new technologies. However, I have always felt that our perceived identity, sometimes from those within our field might be somewhat blurred. This has a significant impact on how the discipline is funded, which positions are created in our departments, nationally and even internationally, and the integration of our discipline as a core and fundamental aspect of any computer science education. As disciplines that may have developed from other areas such as computer graphics, ergonomics, cognitive and social psychology, software and industrial design, and even arts, it can be difficult to position our unique strengths given this very rich heritage. Departments are less 'traditional' these days, and it is becoming easier to carry out a broad range of HCI research in most schools, but we can further enhance our perceived impact to make it easier on next generations to further highlight our growing diversity.

**Xing-Dong:** So when it comes to solving some of the most pressing problems in the field, there are lessons that HCI can learn from visualization, and, of course, vice versa. Can you share with us some of the thoughts you have about this and how you see the two communities can learn from each other to come up with creative approaches to solve problems?

**Pourang:**

I think they both have benefitted from each other in many ways. Information Visualization, traditionally (prior to early 2000s), was

highly static in nature. A large push in the community involved introducing interactivity as a cornerstone of Infovis techniques [33]. We are now seeing an impressive inclusion of approaches being published in the community on data physicalization [17], embedded visualization [27] immersive analytics, and even further reaching approaches such as olfactory viz [20], areas that would have been completely foreign and perhaps less accepted by the Infovis community 15 years ago. I believe to a large extent, work in the HCI has helped shift the discourse on these topics within Infovis and it would be great to further see HCI developments, such as those we see in communities such as UIST (user interfaces and software technologies) have an impact on Infovis. Similarly, I think we have seen great (academic and commercial) success with visualization tools such as Tableau with more recent developments surrounding data analytics. Infovis has really taken on a central role in many Big Data initiatives and we are also seeing some impressive parallel developments in HCI. For example, the work on explainable AI has strong elements of presentation and visualization [22] that can benefit from the decades of Infovis literature and brought into this emerging field in HCI.

**Xing-Dong:** Over the years, you have been working on a wide variety of different projects with your students and collaborators. Perhaps, a lot of us in the audience view the impact of your work in different ways. Can you tell us what is the most impactful outcome of your academic career?

**Pourang:** It is hard to say what might be the most impactful outcomes, but I have mainly enjoyed several areas of research we have developed in our lab. When I transitioned into interaction techniques from working on information visualization, we spent a fair bit of time looking at interaction and navigation interfaces on mobile and wearable devices [15]. We were interested in methods for designing visualization techniques that would adapt to the small mobile screen. This further led to exploring how might these visualizations best guide end-users to more effectively navigate through large workspaces when using really small displays [7]. Given that such devices are generally 'peripheral-free', we developed techniques using alternative input channels, such as pressure and tilt, to assist with the broader task of navigating large information spaces on really small screens [21]. Many trainees, including yourself and Khalad Hasan (now at UBCO) played a big role in these early initiatives. We further improved navigation abilities by tapping into users' spatial memory and abilities, overall producing a new suite of spatial interaction techniques, led by Barrett Ens [5],[9]. Along this theme, we extended our work to account for one-handed and encumbered input **Error! Reference source not found.** We then turned our attention to the idea of embedded data visualizations [6] in the physical world and the design of systems to interact with these. This led us on a path of investigating the properties of optical see-through displays and the design of such devices. The work of Juan-David Hincapié-Ramos and Srikanth Sridharan helped us develop an understanding of color blending [25] approaches using color profiles and color binning techniques. Furthermore, we developed novel scenarios through concepts such as contact Augmented Reality (cAR) [10] as well as novel see-through tablet devices, such as the tPad [11] to facilitate exploring content in-situ

I am also quite pleased on our work at the interface of social acceptability and interactive capabilities to address how comfortable users may feel when interacting with novel

interactions. This has led to new methodology to collect such data and evaluate the social acceptability of novel interaction techniques for head-worn displays (HWDs) [23]. Furthermore, we also examined safety and privacy concerns related to mobile interfaces and interactions, while the user is busy and when additional sensors are added to capture the user's environment [12][32]. This latter work received much attention from the press, including the BBC to highlight our work presented at CHI 2013 in Paris. Aside from the above, our lab has also collaborated on patents, presented our research to the general public and has been active in outreach events to broaden our impact on society.

**Xing-Dong:** As somebody in both HCI and visualization community for a quite long time, you have seen how these two communities have been growing in many different ways. Can you share with our audience your thoughts about what we can learn from the past in order to make a stronger and broader impact in academia and beyond?

**Pourang:** Both fields have evolved in impressive ways. Infovis has become more inclusive of a broad range of interactive techniques and as a community has transformed itself considerably since the years I started in it. I feel HCI has also further broadened in many directions. Both have been recognized as mainstream computing fields with broad support for diverse applications. I think they each have their own series of challenges and should perhaps be looked at separately. For example, for visualization, I believe there is much work to do to improve visual literacy and make it an integral component in each of our daily lives. Can individuals, and even families, benefit from looking over collected and processed information in small chunks to guide their actions? We are seeing banking apps now provide analytics, but even here, these are quite minimal and for the most part we question whether these tools are accessible to the greater community or even of interest. Our work on data videos [1] is one step in the direction of making infographics and data charts of benefit to large segments of society, either at the individual level or even as groups of individuals, such as in families. I believe we are slowly seeing HCI take front and center in addressing some of the larger concerns in society. It would be ideal to see these impacts even grow further.

**Xing-Dong:** Thanks for sharing with us about your career path and some of the thoughts you have regarding where we are heading as a community. Looking now to the future, can you tell us where you see your research is going in the next few years?

**Pourang:** I am excited about a number of different directions we are pursuing. One large topic in our lab is on the development of in-situ interfaces for facilitating the information retrieval and interaction tasks when physical activities are interleaved with the digital. Whether it be fitness, healthcare or even sight-seeing, we observe that interactive and visual tools lack the form-factor, query-readiness, and even presentation needed to minimize information access while optimizing safety, comfort and social acceptability. With current emerging computing platforms, the metaverse and confluencing technologies, we require interaction and visualization even further to support the ability to make computing a digital tool in our daily lives. Much of this work shifts from developing the fundamental platforms, such as by looking at models for color blending [25] to adequately embed information in our environment [27] and tools for interacting such embeddings **Error! Reference source not found.**

Another area we are interested in is the ability to bring data visualization and infographics to the masses. We are continuing the work of past PhD student Fereshteh Amini, and currently Yumiko Sakamoto and collaborators who did some great work on framing data videos and building tools to help design these. Given the significant attraction to youtube shorts, reels and other media for presenting videos, we are identifying what might be some interesting ways to structure these so that not only can users assimilate the information, but also be motivated to take action upon understanding the data. We are continuing to develop these tools so that data videos can be automated and produced on the fly based on end-users' propensity towards graphs and their level of visual literacy. Finally, we are interested in understanding the fundamental process of making users self-aware of their many daily activities from physical fitness to mindful eating.

**Xing-Dong:** You've mentioned several of your students and post-docs throughout this conversation. Alumni from your group have gone on to successful careers in academia or industry. Can you tell us something about your mentoring strategies?

**Pourang:** The projects discussed above were only possible through the significant dedication by many students over the years. I have hoped that a contribution of my work was to inspire students to further advance the field. It is extremely rewarding and exciting to see them build their own independent careers and become significant contributors to the field. I feel that being given the opportunity to mentor students and post-doctoral trainees is one of the highlights of an academic career. I have been very fortunate to have worked with many great students who took interest in our research. I am truly proud of their many contributions, and many – such as yourself – are key leaders in their area of research. I have always believed that a mentor primarily serves their trainees to help discover their potential within the very brief period we work with one another. If a mentor is successful, it is largely a reflection of the student's preparedness and dedication to their research. I strive to provide an environment in which students will thrive and I present as many opportunities to them as possible, via internships in industry with collaborators', or in developing their confidence to develop a research project independently, and by providing them with the best advice and guidance I can at any given point throughout their journey. I feel extremely privileged to have developed some great friendships with many of my students.

**Xing-Dong:** There are many junior researchers in our community, who may view you as a role model. Do you have any advice to them for excelling in their career?

**Pourang:** I hope they have other role models to look up to 😊. I am very impressed by the work of many early career HCI researchers across the country. We are seeing a new generation of researchers that are true trailblazers (a term I adopted from UofM!). They are building significant momentum nationally and are making a strong mark on the international scene. These developments make it very exciting for students in Canada and abroad to seek some of the best HCI training we provide nationally. Aside from the typical concerns ECRs may face when they first start off, which include thinking about developing one's collaboration network, reaching out to the community and working on interesting problems, we should also think of the larger impact of our research. Beyond the traditional measures of impact, how can our research have value to address societal concerns today or that are pressing concerns for future

generations. HCI researchers can play a significant role in addressing global issues such as the digital divide, sustainable development and hunger, and it would be important for us to think collectively about how to play a role in current and new initiatives along these socio-economic lines.

I am also impressed to see the many departments across Canada with multiple HCI faculty openings. I think we have crossed that point where HCI is now viewed as an integral component of a computer science curriculum, whether it features as a single course or through multiple HCI course offerings and even professional programs in HCI. Given all the developments, I really think early career researchers should continue pushing the boundaries, be ready to take some risks and continue building a strong network that spans beyond our national boundaries. Furthermore, I think early career researchers are in a strong position to attract students nationally or internationally to some of the best HCI training available right here in Canada and should not hesitate to advertise their programs widely. We are also seeing many industries partner with HCI faculty and this as well will help further create well-sought after funding and partnerships that can potentially make impact and/or translate research outcomes into practice. As research labs from multi-national firms, not-for-profit agencies, as well as SME seek HCI expertise, I believe we will see a larger uptake of ECRs' research and a potential to have an impact beyond pure academia.

**Xing-Dong:** Before we wrap up, do you have any acknowledgments, thanks, or shout-outs that you'd like to extend to anyone who you consider important throughout your career?

**Pourang:**

I have many acknowledgments to make, from people who acted as my mentors, starting with Colin Ware, but also my many collaborators from whom I have learned tremendously. I am also very grateful to the many students who made a leap of faith and joined my research group. I feel most fortunate when I think of their many ways they helped shape me into a mentor. I am thankful to past and current institutions, by my many supportive colleagues throughout my career and to the many who have also helped me better understand about being an academic. I am grateful to the funding agencies that continue to invest in research and to support us in pushing the envelope for advancing areas critical to improving the human condition. Finally, I don't have any adequate means of thanking my family for supporting me throughout my career.

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