A conversation with CHCCS 2020 achievement award winner Ravin Balakrishnan

Ravin Balakrishnan

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Abstract

The 2020 CHCCS/SCDHM Achievement Award from the Canadian Human-Computer Communications Society is presented to Dr. Ravin Balakrishnan. This award recognizes his significant and varied contributions in the areas of Human Computer Interaction (HCI), Information and Communications Technology for Development, and Interactive Computer Graphics. Ravin's work has had a tremendous impact on real-world applications. His research includes early innovations in areas such as 3D user interfaces, large display input, multitouch gestures, freehand input, and pen-based computing, which has informed and inspired techniques and technologies that are now commonplace in commercial products. a conversation between Ravin Balakrishnan and Prof. Tovi Grossman (University of Toronto) that took place in April, 2020.

The Interview

Tovi: Hello Ravin. Congratulations! I am delighted that you are receiving this CHCCS achievement award!

Ravin: Thank you very much. I feel very privileged and humbled to join the august list of folks who have received this award, several of whom have been mentors and helped shape my career as both a graduate student and faculty member.

Tovi: You have now been at University of Toronto for 20 years. Looking back, would you say are the biggest changes you've seen with research in human computer interaction at your department and more broadly throughout Canada?

Ravin: Well, HCI at Toronto twenty years ago was still considered in the Computer Science department to be a somewhat fringe area, barely tolerated by those in the larger more mainstream research areas, despite the tremendous achievements and efforts of HCI pioneers like Ron Baecker, Bill Buxton and Marilyn Mantei Tremaine who built and grew the HCI group here since the 1970's. Of course, this was not unique to Toronto and similar attitudes were prevalent at many if not most CS departments in Canada and the US. Today, I would, very cautiously, say that HCI has become an established and indispensable part of most major CS departments including mine. This is probably because HCI has matured as a field, our research has become very intertwined with many other areas of CS (and other disciplines), and also it is pretty obvious that early HCI research has had a tremendous influence on current mainstream technologies that all of us use today. To take another example, if I look back to when I started as a faculty member, very few non-HCI graduate students would take a HCI course. In contrast, today you see folks from diverse areas such as graphics, vision, systems, learning, education and software engineering taking our courses and as a result we see HCI innovations and research methodologies being used in other areas. It is also interesting to see that the number HCI researchers in Canada and their output at the top research venues year after year are completely out of proportion to our country's small population!

Tovi: Where do you see HCI research going in the next 20 years?

Ravin: The crystal ball question! Absent a real crystal ball, one can speculate on some of the general trends, which would almost certainly involve new materials and sensors enabling all sorts of interesting new ways in which we can communicate with both our digital data as well interface with the real physical world. Methods for getting a handle on the increasing complexity of our technology has to be a significant research thrust – some of your own recent work, Tovi, on interfaces for complex software systems, is an early start to this thorny problem. I'd love to see HCI people working more on the huge privacy and security problems that are becoming endemic as ever more data is being collected on every front. Of course, I'd be remiss if I didn't include deep learning, which beyond the hype will likely somehow influence many aspects of HCI research going forward. Finally, it's gratifying to see an increasing number of HCI researchers focusing on problems of significant societal importance such as poverty and health.

Tovi: Due to its rapid evolution, it is hard to predict what our relationship with technology will look like, even in the near future. What current HCI research innovations do you think will have the biggest impact on our lives 10 to 20 years from now?

Ravin: We are doing this interview in the midst of the Covid-19 lockdown in Canada, and it's amazing to see how technologies such as video conferencing, with a clear lineage to HCI research at places like Xerox PARC and at Toronto dating back 30-40 years, have become such a crucial and integral part of our lives and helping to sustain many business activities and social interactions despite the unprecedented shutdown of some many aspects of the economy. Talk about research impact! Looking forward, it seems pretty evident that things like AR and VR will eventually become mainstream. Computing embedded into the physical fabric of our daily lives with smart materials and sensors will also likely become real at some point although I'm not sure we'll get there in 10-20 years. Maybe 50.

Tovi: Reflecting on your past research accomplishments, what would you consider to be your most significant contribution over these years, or perhaps your favorite result?

Ravin: It's hard to pick one or even two, as many of the threads of research I've worked on have potentially significant value but in different ways and at different timescales (and of course, some were complete duds!). One positive example that I'm quite fond of is work with Dan Vogel on proxemic interactions [3], which had a certain elegance about it in

its simplicity, and has spawned a good amount of follow-up research by others. Work with Mike McGuffin on interactive manipulation and visualization of 3D volumetric data [2], is also something that I keep showing folks who ask for exemplars from my research career. On a more far out timeframe, work with you on true 3D volumetric displays [1] is certainly nowhere near mainstream yet, but I'm certain will one day be seen as being the fundamental early research in that space when such displays eventually become broadly viable.

Tovi: How have you chosen research topics and research directions?

Ravin: Some of it has been serendipitous, but in general I try to look at dimensions of various technologies and techniques and explore what happens if you stretch one or more dimensions in significant ways. For example, going from flat to 3D displays, or making displays very large or very small, or having multiple cameras in an environment where "multiple" could range from 2 to millions. Such stretches significantly change what we can and cannot do, and opens an entire new playground for developing interesting interface techniques and theories. I also find it useful to know when to move on. One yardstick I often use is to see what industry is currently excited about and if I'm working on research things in that space, it's usually time to move on.

Tovi: What has your approach to tech transfer and commercialization been?

Ravin: The few successes I've had of direct tech transfer from my research lab has been very student driven and my own role has been advisory at best. I think my best tech transfer is really the people who graduate from my lab … highly trained people are the greatest export of universities, and sometimes we academics seem to lose sight of that with all the hoopla about tech transfer and commercialization!

Tovi: What advice do you give to your students about 'failure' and 'rejection' in research?

Ravin: I often tell my students that if a research project or idea has no possibility of failure then it's not really a research project. Researchers (students and especially professors) should take on risky interesting gnarly research problems. Those are the ones with the biggest potential payoff, but of course carry a high risk of failure. It's part of the game, and a key difference between doing "development" and "research". Of course, learning from the failure, tweaking, changing course, are all skills that one should learn and refine during graduate school. I am troubled by the trend of research funding (at least in Canada) being increasingly tied to projects of interest to industry. Such funding tends to steer researchers to much nearer term projects with high likelihood of success, rather than fundamental work. I try to steer my students away from such projects as I feel that graduate school should be about exploring interesting new problems that one can only do at a university and that no company would ever fund.

Tovi: What are the elements in your background that have helped you in your career?

Ravin: Two things. One, I grew up in South East Asia attending schools modeled after the British system and my mother was a school teacher who during my elementary school years made me write a composition (which is what they called an essay) every week. I absolutely detested this, and it went on for some six years. Looking back, however,

I have those darned compositions to thank for my ability to write which ironically even as a professor in a technical field like Computer Science is probably my most valuable skill. Second, as a kid I was always taking things apart and tinkering with all kinds of mechanical gizmos – putting things back together was another story! The myriad often intangible skills I gained from this incessant tinkering continues to imbue everything I've done and continue to do in my research career and life in general.

Tovi: What is the one piece of advice you'd give to a graduate student, who is looking to pursue a career in HCI research?

Ravin: Pick interesting research problems that make you want to get up in the morning to go tackle them, even if they may not be the cool thing today. Also, grad school in particular is the one time where you're free to work almost 100% on nothing but research so make best use of those precious years. Once you graduate, regardless of whether you end up in academia or industry, your job will entail other duties like teaching and administration that will intrude on your research time and you'll look back wistfully wishing you were back in grad school (minus the lower pay, of course)!

Tovi: Thank you very much for this conversation. You have given me lots of things to think about. Congratulations again on your CHCCS achievement award. I will look forward to seeing you at Graphics Interface!

Ravin: Thanks again. Unfortunately, the conference has gone virtual this year due to Covid-19, but I'm sure there will be an opportunity to get together once we are no longer socially isolating!

References

[1] T. Grossman, D. Wigdor, and R. Balakrishnan. Multi-finger gestural interaction with 3d volumetric displays. In Proceedings of the 17th Annual ACM Symposium on User Interface Software and Technology, UIST '04, page 61–70, New York, NY, USA, 2004. Association for Computing Machinery.

[2] M. McGuffin, L. Tancau, and R. Balakrishnan. Using deformations for browsing volumetric data. In Proceedings of Vis 2003 – the IEEE Visualization Conference, page 401–408. IEEE, 2003.

[3] D. Vogel and R. Balakrishnan. Interactive public ambient displays: Transitioning from implicit to explicit, public to personal, interaction with multiple users. In Proceedings of the 17th Annual ACM Symposium on User Interface Software and Technology, UIST '04, page 137–146, New York, NY, USA, 2004. Association for Computing Machinery.