Going Remote: Challenges and Opportunities to Remote Learning, Work, and Collaboration

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Even prior to the pandemic, there was increasing focus on enabling remote work and education. Although many companies have geographically distributed teams and students have moved to online instruction, remote working and learning has yet to become the norm despite the available technology and resources. There are many pros to remote meeting and education including increased flexibility, positive environmental benefits and improved work-life integration, but there are still tangible challenges when it comes to normalizing virtual interaction.

Key challenges include effective communication, preventing isolation, and maintaining social connectivity. Being at the forefront of innovation, our community often leads technology adoption. Since the pandemic has been the catalyst for pushing new technologies forward, this provided an opportunity to explore how to shape the inevitable shift to more distributed and remote styles of working and learning.

At the virtual 2021 International Solid-State Circuits Conference (ISSCC), we had the opportunity to have an event focused on remote learning, working, conferencing, and the future technologies that will improve all three. We had multiple distinguished speakers come talk about each of these topics using the Gather Town platform for presentations and the panel discussion. Ironically, during a discussion about going remote, the Gather Town platform experienced technical difficulties leading to no chance for a full panel discussion. We have re-invited the speakers to provide their perspectives on a few of the topics touched upon in their presentations.

The panelists are:
Edith Beigné is the Research Director of AR/VR Silicon at Facebook Reality Labs where she leads silicon research projects driving the future of AR devices. Her main research interests are low power digital and mixed-signal circuits and design with emerging technologies. Over the past 20 years, she has been focusing her research on low power and adaptive circuit techniques, exploiting new design techniques and advanced technology nodes for different applications ranging from high performance multi-processors to ultra-low power SoC, and, more recently, AR/VR applications. She is the TPC chair of ISSCC 2022, was vice-chair of ISSCC 2021 and part of ISSCC TPC since 2014 as chair of the digital circuits sub-committee. Edith was in charge of organizing the remote ISSCC 2021 conference this year.
David Bol, a professor at UCLouvain, discussed the challenges and opportunities of remote learning. There are didactic pros to remote education including more open communication

between professors and students, but also cons such as student disengagement and inequality between students. Although remote learning has cut down on transportation greenhouse emissions, there are still indirect effects to the environment when it comes to housing and ICT energy use. There are also many psycho-social aspects of remote learning that must be considered such as isolation and depression felt by students during these key periods of life with respect to their personal and social construction.

Kathy Wilcox, an AMD Fellow, talked about the impacts of virtual work over the last year. Although there have been improvements to the technology and tools over the last few years making it easier to connect and socialize with colleagues, she discussed a lack of "over the wall" and spontaneous interactions that improve quality of life at work.

Alvin Loke, Technical Director at NXP Semiconductors, discussed virtual conferencing after serving as the inaugural Virtual Arrangements Chair for the VLSI Symposia in 2020. Drawing on his experience from VLSI, virtual conferences struggled with poor networking, limited attention spans and engagement, and a global workforce with a large time zone spread. Benefits included on-demand video, less travel, and a potential expansion of the conference reach. The presentation brought into question how we will choose to move forward once we get back to normal.

Ofer Shacham, Sr. Director, Head of Custom SoC Compute Platforms, for Facebook Reality Labs, discussed upcoming opportunities in AR/VR technology that could bolster virtual interaction. One of the primary challenges of virtual events is the lost feeling of connection, and AR/VR could improve on these issues. There are still many opportunities for researchers to improve on this upcoming technology by designing high performance and low power silicon.

Q&A:

1. What are we going to do once we get past this pandemic? Will work, education, and conferences go back to fully in-person? Are hybrid options (i.e., virtual and physical attendance) realistic?

   David: I personally think that we will keep some remote practices for specific purposes. Hands-on and practical sessions of courses with EDA tools, for example, are likely to shift to a remote organization because it makes the communication easier with screen sharing capability. Also, from the teacher stand-point, it is also sometimes more convenient to deliver a lecture in front of a screen than in front of 500 students. However, there is an important demand by the students to get back to the university in presence for the social context of their academic cursus. Therefore, I don't see remote education becoming the norm. In my opinion, hybrid schemes with simultaneous in-presence and remote teaching is a worst-of-both-world approach because it is difficult to deliver good remote and in-presence teaching experiences at the same time.

   Kathy: I think that hybrid options are realistic but it will require some communication and planning. One of the main advantages of being in-person is the casual unplanned interactions that really are not the same virtually. For those to be effective, there needs to be a critical mass of the population at the office at the same time. Ideally, those would include others that you work with as well as some that you do not work as closely with.

So, it would be difficult to propose a scheme where employees alternate weeks, which would mean you would never interact with half the population. Also, as Ofer pointed out during the ISSCC panel event, the project timeline has different points that would benefit from in-person brainstorming vs. more focused execution

Alvin: When this pandemic is behind us, I have no doubt that we will go back to in-person conferences. We are all social creatures and there are simply too many pros of meeting each other face-to-face (networking, spontaneous discussions, discreet exchanges, travel for some, etc.) that cannot be replaced by watching a small flat screen at home. Maximizing ROI from a conference also requires being engaged and undistracted, and that's really tough without being on location. That said though, the major SSCS conferences in the past year have been fully virtual and witnessed sustained and even increased registration numbers, signaling a strong appetite for virtual delivery. For many, the cost effectiveness, time efficiency, and convenience of on-demand presentations and limited live streaming alone are enough to justify the registration cost. The right hybrid offering is the big opportunity for conferences to further expand their outreach at the expense of others that ignore this newfound demand for virtual content. The key is to arrive at a balanced and financially viable hybrid format that incentivizes strong in-person attendance which is critical for upholding the vitality of a conference as well as continues to energize conference organizers and speakers to put in the extra mile. Collaborative learning and sharing among conferences will enable us to more quickly adopt successful hybrid strategies. However, as hybrid conferences will require more planning and overhead, it may only make sense for conferences large enough to partake.

Edith: We learnt so much in 2020 about how to organize virtual conferences that we will necessarily use those learnings in the future. We have been forced to go all virtual due to the pandemic but, if we think about the future, hybrid conferences will enable two important missing aspects of today's conferences. First, attendees traveling all around the world are not sustainable long-term. Sustainable air travel is not possible even if there are certainly ways to ensure a lower impact. In addition, conferences showing major advancements in many scientific domains have to be accessible to a broader audience. I am not only thinking about students but also engineers and researchers all over the world who do not have the possibility to travel. We should not prevent them from getting access to knowledge. It is a global diversity challenge.

2. How do you effectively engage with people socially or implement team-building events in a virtual environment?

   Alvin: Effective engagement requires securing and maintaining people's attention. People should participate with the mindset that they will be present physically. This means dress appropriately and turn on your video camera. Many of us are intrinsically impatient and easily get distracted; cell phones don't help. So shared content needs to show frequent screen movement. Virtual events should encourage frequent audience participation through tactics such as launching polls and sharing jokes. Think TV and what's on it that keeps us engaged for hours!

3. With countless on-line meetings, most virtual team events are lame. Enough trivia already! How can technology make virtual team events fun?
   Kathy: One of my colleagues has tried a few things, a rotating 1-on-1 with people on the team to force some conversations to happen. Another idea that he tried was a group meeting where one person kicks off the meeting with a random topic that does not need to be work related, one example was one of the guys showed pictures of his "old house" home improvement projects and challenges. And then this leads into a general discussion. My favorite virtual events outside of work include a cheese tasting and a dumpling cooking class but I am not sure how that translates to work events.
   Alvin: Technology needs to be more transparent to capture the essence of the moment; for starters, much less audio and video latency, with better testing and reliability!
   Ofer: There are great examples of virtual off-sites and all-hands that we have organized using Virtual Reality during the pandemic. It is very engaging and immediately gives the feeling of meeting in the same place at the same time. We work on developing tools and devices so that VR will let people work from anywhere. Freed from the limitations of physical space, VR will offer a better way to surf the web, get more done, and collaborate across distance. This helps us build personal relationships and connections despite physical separation.

4. How can we draw firmer boundaries between our virtual events (work, school, conferences) and our in-person lives to make the most out of both?
   Kathy: I think the boundaries are something that we need to be cognizant about from our own perspective. Boundaries have already gotten harder these days anyway where we have teams that are located around the globe and the ability to check our email on our personal phones. Each of us needs to be clear that there are other commitments in our lives and figure out the best way to manage those boundaries.
   Alvin: It takes a lot of personal discipline to observe these boundaries and respect from others to respect these boundaries. Specific to virtual conferences, getting the most out of them requires planning and committing time, and staying focused while attending virtually. Opportunistically squeezing in time to participate in a conference while multitasking on other regular activities does not work. To draw firmer boundaries, I personally have found it helpful (after some and continued struggling) to embrace a mindset that accepts more virtual events as being the new norm as opposed to being a temporary and short-term transient. This also helps me appreciate and exploit the benefits of virtual events, e.g., attending meetings in the car while waiting at my kids' soccer practice.
   Edith: I have observed that new policies like no-meeting days or no-meeting at lunch time have helped a lot of people to manage boundaries between virtual events and in-person life. Unfortunately, many companies working in different time zones cannot easily apply those policies.

5. Prior to the pandemic, there were debates at SSCS conferences about providing on-line access to some parts of the conference. Since we were forced into virtual conferences this year, what have we learned to practically implement in the future?

Alvin: Most SSCS conferences have converged to a common recipe for attracting virtual attendance. Staying attentive for hours in front of a monitor is exhausting. Furthermore, time zone differences as much as 16-17 hours (North America West Coast to Japan) must be bridged. As such, live streamlining, limited to a few hours per day, was reserved for highlight events such as keynotes, panel events, and Q&A sessions with brief paper teasers. The majority of paper, short course, and tutorial full-length presentations were made available on-demand one to two weeks before the live events. Organizers offered networking events with some but limited level of success. Registration rates were substantially reduced to reflect much lower operating expenses; even then, conferences remained very profitable.
Edith: The majority of attendees of virtual conferences provided very positive feedback when a lot of materials was available to download online and from a unique platform. We will definitely hear that feedback and, in addition, open online chats and Q&As so that virtual attendees can reach out to authors and presenters during the conference. We also realized, surprisingly, that mentoring events are very efficient in virtual format. There are many reasons for that. First, the younger generation is very comfortable with online conferences. Second, this is a safe environment where you can learn from mentors while keeping your videos off. We never think enough about introverted people who won't be comfortable in in-person mentoring events.

6. In talking to colleagues after various conferences this year, the most popular feature of the virtual conference is speeding up the presentations (i.e., 1.5X or 2X). What is your favorite feature of virtual conferences?
Kathy: I totally agree with the speeding up of presentations. That was a feature that I used as well! Voting of questions is also a nice feature.
Edith: My favorite feature is to have access to all materials and chats in a unique online platform. Easy to navigate and providing all necessary information about schedule and events.
Alvin: I thought that having a common website for navigating to the various live and on-demand events really simplified the virtual experience. Smaller event icons so that I could see more in one screen would've been a nice touch.
David: I think this question is very interesting and goes much beyond the scope of virtual conferences. The 20th century was the century of the Great Acceleration that led us to the Anthropocene we now live in. In his work, Hartmut Rosa, a professor in sociology, analyzed the associated acceleration in the rhythm of life that resulted from the shortening of the distances brought by transportation and telecommunication progress. The lockdown situation we experienced induced a duality in our relationship to time: one one side, we can fast forward conference presentations, pack our meetings in our agenda without deadtime, have meetings on the side of the soccer field; but on the other side, we question what is really essential in our life, rediscover the local wonders and the rhythm of nature (for people fortunate enough to be living close to nature). I think we are at a socio-technic crossroad: do we continue on the twentieth-century path or do we transition to another model?

7. Employees with a lot of experience seem to manage remote work fine. In fact, most of the experienced employees prefer remote work. New employees and interns appear to be struggling. How do we mentor our less experienced employees in this remote environment?
   Kathy: Some thoughts include more scheduled check-in times and possibly more mentors. When you are in person, you are able to ask many people for advice, not just your mentor.

8. Is in-person education still valuable or can internet-based learning work for many people? Do we just need to expand Khan Academy to cover college?
   David: Internet-based learning so far fails to bring the social context of the academic cursus: catching up with friends, elaborating projects, meeting random fellow students. I think it is a great complement to in-person education but I don't think it can replace it.

9. Which new remote technology features were viewed as the most useful or least useful?
   Alvin: I really liked the gather.town concept for networking. Very intuitive. Like anything new, it could be improved but is a great start!

10. How can new technology or features continue to improve to make remote meetings more interactive and immersive?
    Ofer: A feature that has not been explored much yet in conferences is immersive learning and collaboration. Enterprises are seeing incredible benefits even beyond immersive learning and collaboration by using immersive Virtual Reality. That feature could be applicable to many conferences and specifically to educational and diversity events. There is a very recent example of an immersive training experience to help allies better understand what it's like for women to navigate the workplace—and learn ways that they can offer support in their own lives.

11. Do we anticipate any socio-technical challenges with technology that helps remote working in the future?
    David: Good question. Do we want to dig further in always-on AR contact lenses or even remote-meeting brain implants? My general opinion is that we as technology developers bear a huge social responsibility because the technologies we develop shape the society we live in. Before asking ourselves, how to make remote meetings more immersive, I think we should set up a democratic process to decide whether or not this is something that citizens expect from us. We passed a turning point where technological progress no longer brings automatically social benefits and citizens start to seriously question the deployment of new technologies. We see it with people deciding to quit social networks and we witness the contestation of 5G roll-out. However, once the technology is there, ROI will be pursued and the technology we developed will be somehow imposed on the citizens. Therefore, I believe we should consult citizens upfront to decide what humanity as a whole identifies as meaningful technologies to develop.