



Adventure and Technology: An Earthquake-Interrupted Expedition to Mt. Everest

Insights

- We present four roles that technology can play during adventure based on an autoethnography of an attempt to summit Mt. Everest that was interrupted by the Gorkha earthquake.
- We suggest employing interaction design to reframe everyday exertion activities as mini-adventures in order to facilitate personal growth (rather than only fixing immediate health issues).

On March 31, 2015, Sarah Jane Pell left our lab to summit Mt. Everest. Her planning required years of physical and mental training, logistical preparation with expert advisors, and competency in using alpine equipment as well as adventure and media technology. Her goal was to climb to the summit of Mt. Everest to explore extreme performance as part of her ongoing research arts practice.

Sarah's background is in novel technology-supported performance research in a range of extreme environments, such as underwater, in remote locations, or in space-analogue conditions. She chose Mt. Everest as

an extreme location for field research in a series of adventures designed to frame an analytical phenomenology of bodily experience "from Sea to Summit to Space" [1].

Sarah intended to capture 360-degree HD video and record artistic expressions made on site. These would be paired with GPS location, altitude, and body-sensor data to create insights into the experience as a means of exploring the possibility of using the expedition as a dynamic space of performance.

Unexpected events, including the earthquake that devastated the region, ultimately prohibited Sarah from



Figure 1. Sarah at Everest Base Camp.

reaching the summit. As such, it was a “failed” expedition, yet we believe we can learn from such extreme experiences to understand something about adventure and technology. By *adventure* we mean an “exciting experience involving hazardous action with uncertain outcomes based around physical exertion in a natural environment” [2].

We reflect on this epic adventure to articulate two dimensions (expected-unexpected and instrumental-experiential) in order to identify four roles for adventure technology: as coach, rescuer, documentarian, and mentor. With this, we aim to provide HCI designers with an initial conceptual lens to embrace adventure. We hope our work helps people experience personal growth and ultimately contribute to our knowledge of supporting people’s active lifestyles.

AUTOETHNOGRAPHY

Although there is an increasing amount of digital technology available that targets the adventure community, little knowledge exists on how to design technology to support the adventure experience across its multifaceted aspects. In order to answer this question, we begin by providing an autoethnographic account of Sarah’s experience in Nepal before discussing it in terms of initial

implications for interaction design.

Autoethnography is “a form of autobiographical personal narrative that explores the writer’s experience of life” [3], in our case Sarah’s adventure in Nepal. Autoethnography has the following advantages: First, it allows for the fullest account of an experience, as no information is lost in communication or interpretation between participant and researcher [4]. Second, prior research suggests that bodily experiences are best understood by going through them oneself [3]. Third, engaging more traditional methods may put study participants into dangerous situations, thereby raising ethical concerns [5]. We acknowledge that Sarah was also in a dangerous situation; as such, we highlight that investigating adventure raises questions around the balance between risk and benefit in terms of threat to life and personal growth.

PREPARING FOR MT. EVEREST—SARAH’S STORY

I decided to climb Mt. Everest in 2010. By 2014, I trained six days per week. I used wearable sensors linked to iOS apps to monitor my progress and set personal fitness milestones: a Jawbone UP fitness tracker paired with a digital sleep-improvement program called Sleepio; Tony Robbins’s Ultimate Edge: Hour of Power audio for mental conditioning

during physical exercise; as well as a range of other neurosonic enhancement programs. In later preconditioning stages, I recorded weight, hemoglobin and blood tests, and V02 MAX fitness results by the Beep Test (aka the Leger-test).

Adventures like this often require fundraising and outreach: I used social media (Twitter, Facebook, and LinkedIn) to launch a Kickstarter and Indiegogo fundraising campaign and created my own website to inform followers of my plans and engage with my blog and Vimeo updates.

On April 2, 2015, I flew from Katmandu to Lukla with five other summit climbers and six trekkers to meet our guide and professional expedition Sherpa and porters. It was a 10-day trek to Everest Base Camp (EBC; Figure 1) to slowly acclimatize to the altitude and test the equipment. Before EBC, my expedition leader returned to India, acting on mixed feelings from the mountain, and therefore I no longer qualified for a group permit. When I reached EBC, I had 10 days to find additional funding for a solo permit before the “Puja,” the blessing of all expedition equipment, summit climbers, and Sherpa by the Lama. I felt burdened by the stress of last-minute remote fundraising. The high altitude and reduced oxygen made all bodily activity more strenuous, and the low air pressure was evident too: Both my body and the equipment casings expanded, making it look like my laptop and face were going to explode.

I returned to Kathmandu, where my permit to proceed was confirmed and a helicopter was booked to take me back to EBC. I felt elated. Sixteen minutes later, more unexpected events unfolded.

GORKHA EARTHQUAKE

On April 25, the Gorkha earthquake struck, with a magnitude of 8.1Ms and a maximum Mercalli Intensity of IX (Violent). The earthquake triggered an avalanche into EBC, killing 22 people. It was the worst natural disaster in Nepal since the 1934 earthquake. A total of 8,617 people were killed, 16,808 people injured, and 2.8 million people were displaced.

This is an excerpt from Sarah’s diary of that day:

I was on the 4th floor of a hotel in Thamel when my room began to rock like a boat. The rocking however was not smooth or predictable like a wave or surge.

It became frenetic and increased intensity from side to side, and then up and down. I went to the doorway of my bathroom, where I heard screams outside. I sat down between the doorframe and braced myself, but the ruptures continued and the 40cm thick concrete walls began to bend and sway: This was clearly an earthquake.

I wrestled with the brass locks on my room door. I always keep myself locked in, but the building was contorting and so it was jammed. I tried to work with the timing of the movement rather than working against it. Shattering pottery, glass and ceramics became louder and louder. My focus sharpened. I opened the door, and braced myself down low in the room doorway. Across the hallway, I saw two male staff members screaming; backs to a wardrobe and feet on the wall, a broom jimmying their doorway open. Just then, the eruption decreased momentarily, and though things were continuing to fall and crumble, we three stood to make a run for it ... I carried my laptop like a flat pizza box. We ran down four flights of stairs to the foyer in the dark. I used my laptop to shield my head from falling debris as I ran from the solid stairwell through the swaying hotel lobby to the main glass doors.

Once outside, the impact of the threat hit me, as visibly injured and distressed groups of people banded together in small open spaces. An abrupt eerie aftermath of raw emotion followed. I felt alone, my stomach churned, acutely aware that I may not be able to let outsiders know that I am alive, or that I may not be able to better resource myself before the aftershocks begin. I saw looters, and scanned for an abandoned scooter helmet to wear but feared moving away. I tried to post to Facebook, and called out for English speakers asking how far was it to the main square—too far.

Sarah remained fully dressed without access to secure shelter, sanitation, food, or water for the next 72 hours. She was in fight-or-flight mode. Sleep and a sense of security were

impossible. On April 28, she reached her embassy to plan for evacuation.

TWO DIMENSIONS FOR ADVENTURE TECHNOLOGY

By reflecting on Sarah's experiences, we were able to identify two key dimensions for adventure technology; together they span a design space (Figure 2). The first dimension relates technology to instrumental and experiential aspects of adventure. The second dimension relates technology to expected and unexpected parts of the adventure.

Dimension 1: Instrumental and experiential. Dimension 1 relates to how adventure technology can support instrumental needs (helping the adventurer to achieve tangible objectives) and how adventure technology can support experiential needs (helping to enhance the adventure experience).

Instrumental. Technology often supports instrumental needs, helping the adventurer to achieve tangible goals. Typical examples are quantified-self products such as Sarah's Jawbone UP activity tracker. These technologies can help adventurers improve performance and therefore aid in achieving objectives.

Experiential. The other end of the dimension is concerned with how technology can support the experience. An example is Sarah's SLR camera: It did not aid her climb, but it did help to enrich the process of observation, reflection, and aesthetic engagement.

Dimension 2: Expected and unexpected. A key aspect that makes adventure exciting is the unexpected. During Sarah's experience many events were expected, but there were also numerous unexpected events, with the most negative one being the earthquake. Nevertheless, all the events combined make the experience an adventure. The second dimension is therefore concerned with the expected and unexpected aspects of adventure. Technology in adventure most likely will be used in both expected and unexpected situations. This in turn might lead to technology supporting, and hindering, adventure in unexpected ways. For example, Sarah's expedition started with expected uses of technologies; however, the expedition took an unexpected turn

that resulted in unexpected uses of technology, such as when she used her laptop to shield her face from falling debris as she escaped the building.

Expected. Technology supports the adventure in expected situations. These situations are often the default or anticipated usage scenario.

Unexpected. The other end of the dimension is concerned with how technology supports any unexpected situations. For example, Sarah hacked her 2G mobile phone to receive BBC updates about the earthquake. When the local network operator went down, Sarah's mobile phone remained in roaming mode, so she changed the network settings to "never" (search for a network provider) and plugged in her headphones to check for FM frequencies, inserting a piece of wire into the audio port to create a shortwave magnetic loop around the device to receive BBC Life Line updates. This was an unexpected use of the technology to manage an unexpected situation.

FOUR ROLES OF TECHNOLOGY IN ADVENTURE

We now use the two dimensions to articulate four roles that technology can play during adventure (Figure 2). These roles can help us analyze existing technology but also act as a guide to develop new systems.

Coach. Technologies can play the role of a coach, providing structured guidance in expected situations to improve instrumental aspects such as enhancing performance. In Sarah's case, neurosonic apps served the role of a coach. She used them to enhance her mental fitness. Many sports apps take on the coach role; for example, Sarah's Jawbone UP app motivated her to improve trekking fitness.

Rescuer. Adventure technologies can also take on the role of a rescuer, for example by providing emergency services during unexpected situations to keep the adventurer alive. Personal Locator Beacons are an example of this kind of technology: With the press of a single button, they alert emergency services via satellite. As they become smaller and more affordable, they are making their way into many adventurers' backpacks.

Documentarian. Technologies can also act in the role of documentarian by providing the adventurer with

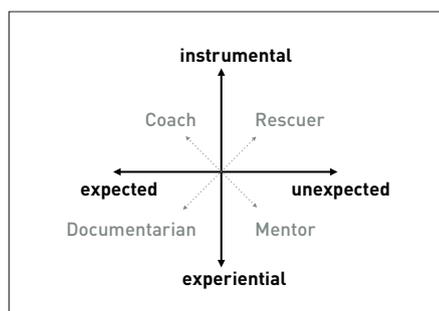


Figure 2. Four roles of adventure technology.

support for any experiential aspects. In Sarah's case, her GoPro camera was probably the best example, taking on the role of a documentarian and supporting her self-expression and storytelling afterward.

Adventurers, in particular adventure sports enthusiasts, have increasingly embraced action cameras, which are now able to capture at a high frame rate to allow for reviewing at different speeds (like slow motion), enabling a novel perspective otherwise not easily achieved. Another way they add value is by providing alternative viewpoints, as demonstrated by Sarah's 360-degree lens that allowed documentation from an immersive perspective.

Mentor. Technologies can also take on the role of a mentor, providing the adventurer with support for critical reflection on what the experience means and what the adventurer learned from it. This differs from the coach role, which is much more oriented to the short term and focuses on skill transfer. Our mentor perspective focuses on supporting the adventurer's opportunity for personal growth. This fits within the emerging area in HCI that investigates embodied interactions as a means for self-reflection. In particular, the investigations into somaesthetics [6] seem relevant here, as they aim to support reflecting on the "felt experience" of engaging one's body.

CONCLUSION

Through these four adventure roles, our work highlights that adventure is multifaceted, and as such, designers should anticipate that adventurers might appropriate technology. This appropriation is not new to interaction design; however, we note that when it comes to an outdoor scenario, Weiser's vision of ubiquitous experiences "in the woods" [7] has not quite yet emerged. Most current technologies have so far not fully considered the adventurer's requirements: portability, robustness, and conduciveness to the performed action and the outdoor environment.

We acknowledge that we have focused on just one adventure and that Sarah went to Mt. Everest with

the intention of climbing for creating artwork, which is not necessarily representative of most adventures. Nonetheless, adventure activities often involve self-expression elements much like Sarah's. We also acknowledge that our results are preliminary and that other practices such as user-centered design processes could supplement our findings. Furthermore, future work could elicit feedback from other adventurers, complementing a personal account such as Sarah's. Studies where adventurers test prototypes might also reveal additional insights.

Overall, we note that technology does not need to make everything safe and predictable. Rather, we believe that technology should support—and not just reduce—adventure, and that design can facilitate this. We hope our work could also be beneficial for the design of a range of systems for related fields, such as rescue equipment, outdoor sports tools, and exertion games. Our dimensions might also contribute to the design of wearable sports technologies such as sports watches and heart rate monitors, highlighting opportunities to designers who want to consider adventure when supporting physical activity.

We believe that applying our four roles of technology from an intense adventure to everyday exertion activities (such as jogging) allows us to reframe these into everyday mini-adventures and thereby facilitate personal growth in participants. This will result in better interactive devices that go beyond the currently prevalent Cartesian perspective promoted by activity trackers and quantified-self devices, which generally provide users with data only to fix immediate health issues, ultimately functioning as devices that aim to defer death. We argue that we should see any exertion activity, whether it is climbing Mt. Everest or a jog at lunchtime, not as a tune-up for our weak bodies that need a fix, but rather as an opportunity to facilitate personal growth.

We hope our work is able to inspire and guide designers interested in adventure and interaction design, that it can help people experience personal growth and ultimately contribute to

our knowledge of active lifestyles and how to support them.

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ENDNOTES

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