



# From the Editor in Chief

Editor in Chief: Maria R. Ebling ■ IBM T.J. Watson Research Center ■ ebling@us.ibm.com

## The Importance of Being... Bored

*Maria R. Ebling, IBM T.J. Watson Research Center*

**O**n my ride to work in the morning, I'm usually listening to NPR. Recently, NPR's New Tech City ran a program called "Bored and Brilliant." I found the series fascinating and enjoyed their challenges. I'd like to share parts of it here and issue my own challenge for our readers.

### INNOVATIVE DAYDREAMING

Neuroscientists have been studying what the brain does when it isn't doing anything in particular.<sup>1</sup> Neuroimaging studies have found that the brain is surprisingly busy. In addition, the body is putting quite a bit of effort into that activity, as measured by a drop in blood flow of just 5–10 percent during periods of "rest." Functional magnetic resonance imaging suggests that daydreaming is the default mental state of the human mind.

Meanwhile, Sandi Mann from the University of Central Lancashire wondered what could possibly be the evolutionary point of boredom. Mann performed a study in which she got participants as bored as possible—having them copy phone numbers from a telephone book for 20 minutes—after which point she asked them to think of as many uses as possible for two paper cups.<sup>2</sup> In the next experiment, she had them do something even more boring—simply read the phone book. Yet

the participants who read the phone book were much more creative in their answers about those two paper cups. Participants who copied out the phone book came up with ideas such as using the cups as holders or planters. Participants who read the phone book came up with ideas for turning those cups into earrings, musical instruments, and more.

In considering this burst of creativity, the belief is that boredom gets you to start daydreaming and allows your mind to wander. It moves you beyond the conscious mind to the subconscious, which is where your imagination is most active. Consequently, "missing out" on boredom could be a major problem from the perspective of inventing creative solutions to important problems.

What does this have to do with pervasive computing? Consider the last time you were bored and what you did. Did you pull out your smartphone and check your email? Play a game? Watch a video? Smartphones provide an endless stream of entertainment (as long as your battery is charged). We never have to be bored! And if we never have to be bored, are we losing the potential time to daydream and find creative, imaginative solutions to important problems?

This brings me to NPR's "Bored and Brilliant" series. The series,

which walks you through the science behind the importance of being bored, challenges you with different ways of bringing boredom back into your day. See the "NPR: New Tech City's 'Bored and Brilliant' Challenges" sidebar for a description of each day's challenge.

### ACCEPTING THE CHALLENGE

Here, I examine my own experiences with the six-day "Bored and Brilliant" challenges.

### Pocket Your Phone

I couldn't complete this challenge because it wasn't realistic for me. Women's clothing generally either doesn't have pockets or has pockets too small to be of any use, so I carry my phone in my purse or my hand (at work). This past week, I carried my phone and my laptop in a bag all day. I found that it became a conscious decision to check my phone rather than a habit when my mind began to wander. I was concerned that I would miss important texts or calls, but that turned out not to be a problem (and, yes, I did catch an important text message even though my phone was in my tote bag). I am undecided about whether I will continue to carry my phone and laptop in a bag every day, but it's something I'm considering.

**MISSION STATEMENT:** IEEE Pervasive Computing is a catalyst for advancing research and practice in mobile and ubiquitous computing. It is the premier publishing forum for peer-reviewed articles, industry news, surveys, and tutorials for a broad, multidisciplinary community.

## NPR: NEW TECH CITY'S "BORED AND BRILLIANT" CHALLENGES

Here are the daily changes issued as part of the "Bored and Brilliant" series. For more information, see [www.wnyc.org/series/bored-and-brilliant](http://www.wnyc.org/series/bored-and-brilliant).

**Day 1: Keep Your Phone in Your Pocket**

Keep your phone in your bag when you are in motion. By not carrying your phone, you ease your sense that part of your attention must be on your phone. It will also open up some time to daydream. To learn more, read *The Distraction Addiction*, by Alex Soojung-Kim Pang (Little, Brown and Company, 2013).

**Day 2: Photo-Free Day**

See the world through your eyes—not your screen. Don't take any photo! A study done at Fairfield University in Connecticut showed that taking a photo in an art museum impacts your ability to remember what you see.<sup>1</sup> By outsourcing your memories to your camera, your brain doesn't bother storing the information.

**Day 3: Delete That App**

We all have that one app that we spend too much time on. Find the app that is wasting your time... and then delete it. For more information about how these games can be addicting, check out *Hooked: How to Build Habit-Forming Products* by Nir Eyal (2013).

**Day 4: Take a Fauxcation**

Disconnect from the digital world for a day. Set an out-of-office message as if you were on vacation. Set an "away" message on instant messaging and social media. Disconnect at work and take some time to just think.

**Day 5: One Small Observation**

Go somewhere public, anywhere, and hang out. Observe the world around you and let your mind wander. Just notice something—anything. This is the type of situation in which humans are most creative and imaginative.

**Day 6: Dream House**

Put your phone away. Get bored (by watching a generous pot of water come to a boil or writing 0s and 1s on a small piece of paper in small font). Then, empty the contents of your wallet onto the table and use the items to create your dream house. Give the house a name, take a photo, and then send it in.

**REFERENCE**

1. L.A. Henkel, "Point-and-Shoot Memories: The Influence of Taking Photos on Memory for a Museum Tour," *Psychological Science*, Dec. 2013; <http://pss.sagepub.com/content/early/2013/12/04/0956797613504438.full.pdf+html>.

**Put Down the Camera**

The "no photos" day was probably the least appropriate challenge for me. Because I normally don't take photos except during touristy activities and because this challenge occurred on a workday, this was trivial for me. I did find the discussion about how taking photos can hurt our ability to remember the experience very interesting and will need to consider this during our next vacation.

**Stop Playing Useless Apps**

This was my favorite challenge. I deleted two time-wasting apps: Two Dots and Bonza. And I don't miss them! I don't turn to them at every "boring" moment. I also don't accidentally stay up late playing them. They both stayed deleted on Day 4 and beyond.

**Disconnect**

This was another favorite challenge—taking a fauxcation from the digital world. In fact, I do this regularly when I need quiet time when thoughtfulness is required. For example, as I write this message, I am not connected to email, nor to

instant messaging, nor to Facebook. My laptop is open and I am using a computer, but it is a tool to support me and not a tool that can demand anything from me.

**Observe**

For this challenge, I went to a large bookstore in New York City, with "miles" of bookshelves. The interesting thing is that people were not, by and large, using their phones. They were looking at books. My child sat on the floor reading a book that a friend had just purchased. No texting. No videos. No games. Just reading... *paper* books!

**Embrace Boredom**

I must admit that I didn't bore myself and then try to build a dream house out of items in my wallet. I just couldn't bring myself to watch a pot of water come to a boil! That seems a bit too much like watching the grass grow! But those who did complete the challenge produced some pretty creative work (see [www.wnyc.org/story/winning-wallet-dream-houses-artist-nina-katchadourians-picks](http://www.wnyc.org/story/winning-wallet-dream-houses-artist-nina-katchadourians-picks)).

**Lessons Learned**

The biggest lesson I took away from the "Bored and Brilliant" series was to remember to be purposeful about when to use technology. Another lesson was that being bored is good because our brains might do critically important work during exactly that sort of "down time." And finally, I took away the lesson that I need to make sure that my use of technology does not take away 100 percent of my boredom.

The conclusion of the series got me to thinking about other challenges, ones appropriate to pervasive computing users. My plan is to issue my own challenge to you each issue to help you evaluate your use of pervasive technologies and help you find more time to be bored! You'll find the first challenge in the "Pervasive 'Bored and Brilliant' Challenge" sidebar.

**IN THIS ISSUE**

The theme for this special issue is "Interacting with Smart Spaces," with Sumi Helal and Sasu Tarkoma serving as guest editors. Smart spaces hold the potential to allow technology to support our needs

and fade into the background. Might they someday also support boredom? Perhaps we could check our phones at the door, knowing that the room would inform us if an important call or notification arrived. Of course, there are many challenges that the designers of such smart spaces face, ranging from the question of where to process captured data to that of how to know who is located where within the space. I thank Helal and Tarkoma for the excellent work they have done to bring you this issue, which explores many of these challenges.

I'd also like to take this opportunity to thank *IEEE Pervasive Computing* reviewers. For a list of the 2014 reviewers, please see [www.computer.org/cms/Computer.org/dl/mags/pc/2015/02/extras/mpc2015020005s.pdf](http://www.computer.org/cms/Computer.org/dl/mags/pc/2015/02/extras/mpc2015020005s.pdf).

We also have two feature articles this issue. The first is "Proximity Detection with RFID," by Miodrag Bolić, Majed Rostamian, and Petar M. Djurić. They show how their Sense-a-Tag system can facilitate the Internet of Things. One key feature of the IoT is the ability for things to know about other things in their immediate vicinity—which isn't possible with UHF-based RFID systems. However, using their approach, the authors show how to perform fine-grain localization in a few different scenarios using a traditional RFID system enhanced with a network of Sense-a-Tags.

The second feature article is "Predicting Reduced Driver Alertness on Monotonous Highways," by Gregoire S. Laure, Andry Rakotonirainy, and Anthony N. Pettitt. The authors evaluate a range of machine-learning algorithms for their ability to detect reduced driver alertness. They use EEG signals as the gold standard and examine a number of surrogate measures that are easier to collect in a vehicle, including heart rate and eye activity. Their findings show that neural networks can detect a substantial number of periods of inattention with a low rate of false alarms in plenty of time to support in-vehicle interventions. These exciting results do have some limitations, which

## PERVASIVE "BORED AND BRILLIANT" CHALLENGE

How does social media enhance or detract from boredom? I considered my own use of Facebook, which I access more and more from my phone these days. I originally joined Facebook to see photos of my adorable niece. Over time, my Facebook feed has become dominated by Mashable and BuzzFeed and similar streams. I find these feeds to be entertaining, but in the category of the time-wasting app. So, I recently hid those feeds. This increases the percentage of updates coming from friends and family and I'm enjoying Facebook more. Another challenge that went from trial to permanent!

So my challenge for you this issue is to examine your social media. What elements of your feeds are serving your needs? What elements are wasting time? Once you identify these "empty calories," hide them for a day or week and see whether you think the change is positive or negative.

are discussed in detail in the article. The question in my mind is whether these ideas can be implemented in vehicles before driverless cars become available.

For our department lineup this issue, I'm afraid we begin by saying goodbye to a dear friend and colleague, Gaetano Borriello. Gaetano was a founding member of the Editorial Board of *IEEE Pervasive Computing* until stepping down from our Advisory Committee in late 2014. We will deeply miss his kind heart, generous spirit, and wise counsel. Please be sure to read the In Memoriam department—my tribute, honoring his legacy.

Another tribute for Borriello occurred at the Sixteenth Workshop on Mobile Computing Systems and Applications (ACM HotMobile 2015), which is covered in our Conferences department. Brad Campbell, Thomas Zachariah, and Noah Klugman from the University of Michigan report on the workshop, which began with a keynote by Mark Corner, CTO of Fiksu and associate professor at the University of Massachusetts, Amherst. Corner shared his views of the academic and start-up worlds and discussed both their similarities and differences. Campbell, Zachariah, and Klugman then summarize the papers and topics and discuss the tribute at the conference banquet. Participants toasted the memory of Borriello and his many contributions to the field. I think he would have liked that.

Furthermore, we've done something different this issue and are covering two recent events in our Conferences department. In addition to the HotMobile

report, Nicola Dell and Trevor Perrier from the University of Washington report on the 2014 ACM Annual Symposium on Computing for Development. They provide a nice overview of each of the keynotes and each of the papers presented during the conference. I was impressed by the variety of work being done to address the significant challenges experienced in developing areas. They also observe that one of DEV's strengths is the diversity of its participants, with researchers coming together from many different communities, allowing for cross-pollination and seeding interesting collaborations.

Our Innovations in Ubicomp Products department highlights the role of tooling in the IoT. Christian Weichel, Jason Alexander, Abhijit Karnik and Hans Gellersen describe two IoT tools and the ways they are used in digital fabrication to reduce the number of context shifts makers typically experience. Each context shift disrupts the flow of design, and these tools have shown a significant reduction in context shifts. This work highlights the intersection between IoT technologies and digital fabrication!

This issue's Health department looks at "Living Labs for Pervasive Healthcare Research." Jesus Favela, Jeffrey Kaye, Marjorie Skubic, Marilyn Rantz, and Monica Tentori look at three different living laboratories: the Oregon Center for Aging and Technology, the Tiger-Place senior housing center in Missouri, and the Pasitos smart school for children with autism. They consider the utility of these living labs in terms of both user-centered design and evaluating pervasive

## FROM THE EDITOR IN CHIEF

technologies in the field. They also highlight the challenges living labs face in terms of funding, maintenance, and data overload. If you are considering building a living lab, this article is a good overview of the costs and benefits such a lab provides and gives good pointers to a number of examples.

In our Smartphones department, Thierry Moreau, Adrian Sampson, and Luis Ceze bring approximate computing and its relevance to pervasive computing practitioners to our attention. They highlight work done to build programming language extensions, a compiler that makes energy/performance trade-offs, and a hardware co-processor that supports approximate computing. Applications of this technology to image recognition or sensor data analysis might come to a smartphone near you in the (not-too-distant) future. This is certainly a technology worth following!

This issue's Notes from the Community discusses a number of interesting topics. One discussion examines some

of the ethical issues of monitoring our children. Another takes a look at a 3D printed exoskeleton to defend a woman's personal space. A third summarizes some of the very real issues around drones flown by inexperienced pilots. This third topic hit a nerve with me because, during a tour I took at Olana, a historic property in New York State, I observed first-hand the concern of the staff when two teenagers showed up with remote-controlled aircraft. One wrong "turn" could cause untold damage to the historic property—and apparently has in the past. I encourage you to join our subreddit community and participate in the discussions.

In closing, one of the things I like most about *IEEE Pervasive Computing* is learning about the many ways people are using technology to serve our communities, whether that's serving people in the developing world or figuring out how to make better use of

precious joules. However, I challenge you to be mindful about your use of technology. Use it to serve you and the rest of humanity; don't allow it to waste your time and reduce your creativity!

## REFERENCES

1. K. Smith, "Neuroscience: Idle Minds," *Nature*, 19 Sept. 2012; [www.nature.com/news/neuroscience-idle-minds-1.11440](http://www.nature.com/news/neuroscience-idle-minds-1.11440).
2. "Being Bored at Work Can Make Us More Creative," *Science Daily*, 9 Jan. 2013; [www.sciencedaily.com/releases/2013/01/130108201517.htm](http://www.sciencedaily.com/releases/2013/01/130108201517.htm).

**Maria R. Ebling** is a director at the IBM T.J. Watson Research Center. She manages a team building systems capable of supporting a Smarter Planet while not forgetting about the people who use such systems. Ebling received her PhD in computer science from Carnegie Mellon University. She's a member of the IBM Academy of Technology, a distinguished member of the ACM, and a senior member of IEEE. Contact her at [ebbling@us.ibm.com](mailto:ebbling@us.ibm.com).



# Call for Articles

## IEEE Pervasive Computing

seeks accessible, useful papers on the latest peer-reviewed developments in pervasive, mobile, and ubiquitous computing. Topics include hardware technology, software infrastructure, real-world sensing and interaction, human-computer interaction, and systems considerations, including deployment, scalability, security, and privacy.

**Author guidelines:**  
[www.computer.org/mc/pervasive/author.htm](http://www.computer.org/mc/pervasive/author.htm)

**Further details:**  
[pervasive@computer.org](mailto:pervasive@computer.org)  
[www.computer.org/pervasive](http://www.computer.org/pervasive)

**IEEE pervasive COMPUTING**  
 MOBILE AND UBIQUITOUS SYSTEMS