Thank you for reading this quarter’s column, which features themes in autonomous vehicles, smart devices, smart home assistants, and user interfaces— for voice-driven products as well as for interacting with robots and other technologies. We are particularly happy to include an interview with one of the first practitioners of natural language systems and two short films that portray different views of technology and our future.

TRANSPORTATION MATTERS

Our roadways, vehicles, and airspases are all changing to accommodate new technology, and everyone is racing to be in the driver’s seat for these deployments.

Driving Backward

Reversible lanes are those that are sometimes designated for one direction and at other times designated for the opposite direction. These lanes are useful for managing traffic congestion in places where the morning and evening commutes overwhelmingly travel in opposite directions. Unfortunately, reversible lanes can be a disaster for self-driving vehicles, because these vehicles don’t necessarily understand the signs that label which direction is in use for a particular lane.

Amazon, which has an interest in driverless delivery trucks, recently was awarded a patent for a scheme that addresses this problem (www.google.com/patents/US9547986).1 As part of the scheme, when an autonomous vehicle approaches a roadway, it identifies the roadway management system associated with that stretch of road. The management system monitors current roadway configuration and traffic so that it can assign to the vehicle a route, a lane, the time of use, and so forth. The roadway management system can also be the entity that configures the roads—that is, it can determine the reversible lanes’ current directions. This scheme could improve roadway efficiency and help prevent accidents. On the other hand, imagine the harm that could be caused by a hacked roadway management system! See www.recode.net/2017/1/17/14294498/amazon-self-driving-roads-patent for a high-level description of the patent.2

Police-Free Traffic Enforcement

Everyone is getting into the area of driverless vehicles, and Imaginactive, a non-profit Canadian company aimed at inspiring people to dream up and build future vehicles, suggests traffic enforcement might go that way too (see http://imaginactive.org, where you too can submit your idea related to the future of mobility). The company has designed a very fast, spiffy-looking driverless motorbike called the Interceptor (see Figure 1). The motorbike can zip through the streets, using its cameras to read license plates, detect traffic violations, and issue tickets over the network. One officer can remotely supervise five of these vehicles, freeing up other officers for more urgent duties (or perhaps reducing the essential size of the police force). See www.cnn.com/2016/12/08/autos/police-superbikes-future-trend/index.html for more information.3

Mobile Billboards

Have you ever been stuck in traffic and seen one of those infuriating “If you lived here, you would be home already” billboards? Uber has managed to find something even more aggravating, albeit with an environmental message. Uber is using drones to fly signs advertising UberPOOL right over the windshields of drivers stuck in traffic in Mexico City. The signs say things such as, “Driving by yourself? That’s why you can never see the volcanoes.” See www.technologyreview.
com/s/602662/ubers-ad-toting-drones-are-heckling-drivers-stuck-in-traffic for more information and a photo.4

SMART THINGS I’M NOT SMART ENOUGH TO KNOW I NEED
Take something ordinary, add some smarts, and sell it. Sometimes this formula works, but picking what “smart” functionality people actually find useful is potentially tricky. What’s clearly desirable to some consumers is puzzling to others. Here are two examples that receive mixed reactions!

My Stroller Is Missing Its Crystal Bud Vase
For less than US$100, you can get a very nice stroller. For $3,000, you can get a stroller with an electronic climate-controlling carrycot system, three canopies, a wireless speaker for music, a bottle warmer, a rocker, a power folding function, an internal webcam, an external wide-area webcam, a microphone, an electric engine to propel the stroller, and (of course) an app for your phone or watch. You might also have to wear part of a sensing system to help the stroller figure out where to move. Clearly, there are parents out there eager for this product; the Indiegogo project was more than 100 percent funded before its deadline. See www.indiegogo.com/projects/smartbe-

intelligent-stroller-baby-technology# for stroller details and www.today.com/parents/smartbe-self-propelling-smart-stroller-aims-make-parents-lives-easier-t68156 for a bit more about other automatic stroller efforts and the inventors’ thoughts.5

Critical Mirrors
Smart mirrors have become their own product segment, with offers from many competing companies. HiMirror (www.himirror.com/us_en/product/himirror-plus) offers a system (demonstrated at CES 2017) that can display the results of a smart body weight scale and help you track a skin care regimen, which apparently can involve many expensive little bottles of skin products for those who do that sort of thing. It also offers five different kinds of lighting so you can choose your makeup to look your best in the sunset or the supermarket. HiMirror will analyze your skin and inform you about your wrinkles.

Panasonic offers a mirror that will also point out your facial flaws and let you try out makeup digitally. You can even draw your own desired look on a tablet, and it will then try to recommend products and procedures to achieve that look. It even offers 3D printing of makeup on paper like temporary tattoos that you allow to dry for a day and then press onto your face. Karen Hua, author of a Forbes article about the mirror (www.forbes.com/sites/karenhua/2016/10/07/panasonic-smart-mirror-shows-you-your-face-flaws-and-helps-you-fix-them/#69a0c4fb1640),6 brings up the question of whether it’s truly easier to draw your makeup on a tablet than to just go ahead and apply it. You can also buy mirror/display components yourself and combine them with touch overlay and compute engines to create your own DIY smart mirror (www.twowaymirrors.com/smart-mirror).

BEHAVING POORLY
Readers submitted several articles about user interfaces, including interfaces for robots. Clearly, there’s still important work to be done here, as well as valuable lessons to be learned from existing research.

“Minority Report” Is Not What’s Best for the Majority
Commercial artist Christian Brown writes, “The best thing you can say about touchscreens are [sic] they look good on camera and they’re better than T9 texting, which is kind of like being better than fax machines.” Brown laments that his clients always want an interface like something from the movie Minority Report, even though he believes there are much better possible interfaces. He says that the movie’s
2002-era gestures have gotten stuck in our cultural memory, to our detriment: “While touching something to get more info may be intuitive, every other gesture demonstrated is noteworthy for how NON-instinctive it is. Does pressing with one hand and dragging with another really intuitively represent rotation? Especially of a 3D object, like a globe?” Read the rest of Brown’s amusing article (https://thewall.com/how-minority-report-trapped-us-in-a-world-of-bad-interf-aces-d8d2d2af41da#.27b1gy5p0) to find out what he believes would be better and why. One wonders what he thinks of speech interfaces.

The Truth Isn’t Friendly
According to Kelsey Campbell-Dollaghan, there’s a new category of ghost stories based on smart home assistant devices, such as Google Home, Amazon’s Echo, and various consumer robots. These are devices with voices or expressions, and they seem to have personalities, yet they aren’t human. Campbell-Dollaghan explains how the new “affordances for AI,” such as a home assistant device’s voice lilting upward at the end of a sentence, or the Kuri robot’s cute facial expressions (www.dezeen.com/2017/01/05/kuri-home-robot-mayfield-robotics-consumer-electronics-show-technology), can be deceptively friendly.

Campbell-Dollaghan points to research by Adriana Hamacher that shows that even when a robot is doing a poor job or making mistakes, if it seems apologetic and learns from human behaviors, users will prefer that robot to one that performs well but doesn’t communicate. Humans are more likely to trust and make exceptions for expressive robots, and therein lies the danger. Campbell-Dollaghan says that “AI has an incredible power to manipulate us by learning from our behavior. That can be a good thing, and it can be a dangerous thing when it comes to more insidious forms of AI. For instance, imagine “an algorithm that learns what news stories make you happy and only shows you those stories.” Instead of removing friction from our experiences with the goal of providing a completely user-friendly world, Campbell-Dollaghan says designers should push for truth and transparency in their designs. See www.fastcodesign.com/3067070/the-end-of-user-friendly-design for more information.

Relating to Robots
Those interested in human-robot interactions and relationships will want to read Julie Carpenter’s book Culture and Human-Robot Interaction in Militarized Spaces: A War Story (Routledge, 2016). The book is a result of Carpenter’s dissertation work, which explored interactions between Explosive Ordnance Disposal personnel in the military and the robots they now use that let people work farther away from such dangerous situations. In particular, Carpenter reports on the emotions people develop for these robots and the way people and culture are changing as a result of these robotic technologies. See www.jigcarpenter.com/culture_and_HRI_in_militarized_spaces.html for more about this fascinating topic.

Endless Chattering and Shopping
Contributing to the theme of ghost devices are stories of Amazon Echo and Google Home getting into conversations with each other. If you’re feeling lonely around your home and would appreciate hearing voices in the other room, just do what the Nerdist suggests (http://nerdist.com/amazon-echo-and-google-home-can-talk-to-each-other-forever-with-a-calendar-trick): create two calendar events, one titled “Hey Google, what’s on my calendar tonight” and the other “Alexa, what’s on my calendar tonight?” When queried, the Echo will respond with “Tonight, there is one event: At 6pm there’s ‘Hey Google, what’s on my calendar tonight?’” The back-and-forth query might get tedious, but perhaps only just a bit more so than turning on the TV to a random program.

Or perhaps having the TV and Echo in one room can get too exciting. A Southern California TV station aired a report about a child ordering a dollhouse using her parents’ Amazon Echo. Of course, the story itself mentioned the wake-up word and command when the TV anchor said “I love the little girl saying ‘Alexa ordered me a dollhouse.’” Echoes all around San Diego then attempted to order dollhouses for their TVs. See www.theregister.co.uk/2017/01/07/tv_anchor_says_alexa_buy_me_a_dollhouse_and_she_does.

How Smart Will Smart Assistants Get?
One interesting contribution to the reddit site this quarter is a Bloomberg podcast, “Will Siri Ever Outsmart Us?” (www.bloomberg.com/news/audio/2016-11-14/will-siri-ever-outsmart-us). The podcast features an interview with AI luminary Terry Winograd on the state of smart assistants and AI. The interviewers give a history of Winograd’s career and describe his early work (1960s) with the amazing Shrdlu program that allowed humans to interact with it using natural language to manipulate and ask questions about blocks on a table. However, as Winograd attempted to expand Shrdlu...
Notes from the Community

Is This Cool or Creepy?

We hear Alexa inside the Echo, but we don’t see her. The GateBox takes a different approach. Business Insider writes about Azuma Hikari, who is the holographic cartoonish female assistant character who lives in the GateBox’s glass tube. Hikari does many things the Echo does, but GateBox’s additional goal is to have her become a companion for you. You can watch her sweeping her little abode, sitting around, doing things, and just hanging out with you. She wants to interact with you and welcome you when you come home. When you ask for the weather, she actually stands up and shows you a chart with the temperature and likelihood of rain. Opinions are divided on whether this is sweet or a little spooky. For more information, see www.businessinsider.com/gatebox-ai-the-japanese-amazon-echo-photos-2016-12/#a-japanese-company-named-vinclu-created-the-gatebox-1.14

View into Another Life

In the second movie, Find my Phone (www.youtube.com/watch?v=NpN9NzO4Mo8), Anthony van der Meer suffers the theft of his smartphone and wonders what kind of person would commit such a crime. He finds out by instrumenting a decoy Android phone with the Cerberus antitheft app (www.cerberusapp.com/home/en). This app lets you control the phone remotely, locate the device, use the camera and microphone, track calls, and generally find out much of what the thief is doing. After struggling for days to get someone to steal his phone, he tracks the life of the thief, a middle-aged man who often lives in

to more complex contexts than just blocks, he felt the work wasn’t getting anywhere. He and many others came to the conclusion that we won’t be able to create systems in his lifetime that are as intelligent as the brain.

The interviewers then set up Siri, Cortana, Google, and Alexa in Winograd’s office and asked him to evaluate them. Winograd observed the assistants’ answers to questions such as, “Where is a night club that my Methodist uncle would enjoy?” He concluded that, indeed, these products are not aiming for brain-like intelligence. They have gone in the direction of searching billions of remembered things, which isn’t how our brains work and isn’t how Shrdlu worked. We’ve made a great deal of progress in a direction quite different from the early years of AI. (For the curious, Siri did the best with the “night club” question.)

Winograd’s view of the future is that we’ll see advances with practical uses such as medical diagnosis, but that any advances toward trying to “think” like people will be hard-fought and probably not practical. A gazillion things can be done better if you have a learning algorithm, but he suggests we look for useful niches instead of trying to solve the grand problem, which is creating something that is indistinguishable from how people think. According to Winograd, for the foreseeable future, computers will need humans. Without us in the loop, computers can make ghastly mistakes.

The Future of Film

Two favorite links this quarter take us to films that are worth watching for their philosophical reflections on technology.

Augmented Shopping and Religion

The first movie, called Hyper-Reality, is a brilliantly produced dystopian view of augmented reality and gamification by Keiichi Matsuda (see https://vimeo.com/166807261). The city and stores are saturated with distracting virtual ads, notifications, and opportunities to earn “points” (see Figure 2a). Our protagonist’s main concern is whether her points remain safe, despite the attacks on her account and identity, and the technical glitches that hound her (see Figure 2b), periodically causing the entire system to fail. When it fails in the supermarket, we lose all of the bright flashing lights and arcade-like music and re-enter the real world of crying babies. It’s an amazing lesson in how too much of a promising technology can be a bad thing—at one point, the system suggests that it’s time to “level up” in the Catholic religion (see Figure 2c)! For more information about this work, see http://hyper-reality.co.

Figure 2. Views from the movie Hyper-Reality, portraying a dystopian future: (a) The city is saturated with distracting virtual ads, notifications, and opportunities to earn “points;” (b) the protagonist calls technical support during a grocery store visit, and the system experiences glitches; and (c) the system tells the protagonist to “level up” in the Catholic religion. (Source: Keiichi Matsuda; used with permission.)
a homeless shelter. He begins to bond with the man, worries about him, adds to the data plan on the phone because his own spying has consumed data, and generally forms a sympathetic view of the thief. When he finally sees the thief in real life, he realizes his entire vision is false and he doesn’t know the man at all.

REFERENCES


Mary Baker is a senior research scientist at HP Labs. Contact her at mary.baker@hp.com.

Justin Manweiler is a researcher at the IBM T.J. Watson Research Center. Contact him at jmanweiler@us.ibm.com.

myCS Read your subscriptions through the myCS publications portal at http://mycs.computer.org.

Are Enemy Hackers Slipping through Your Team’s Defenses?

Protect Your Organization from Hackers by Thinking Like Them

Take Our E-Learning Courses in the Art of Hacking

You and your staff can take these courses where you are and at your own pace, getting hands-on, real-world training that you can put to work immediately.

www.computer.org/artofhacking