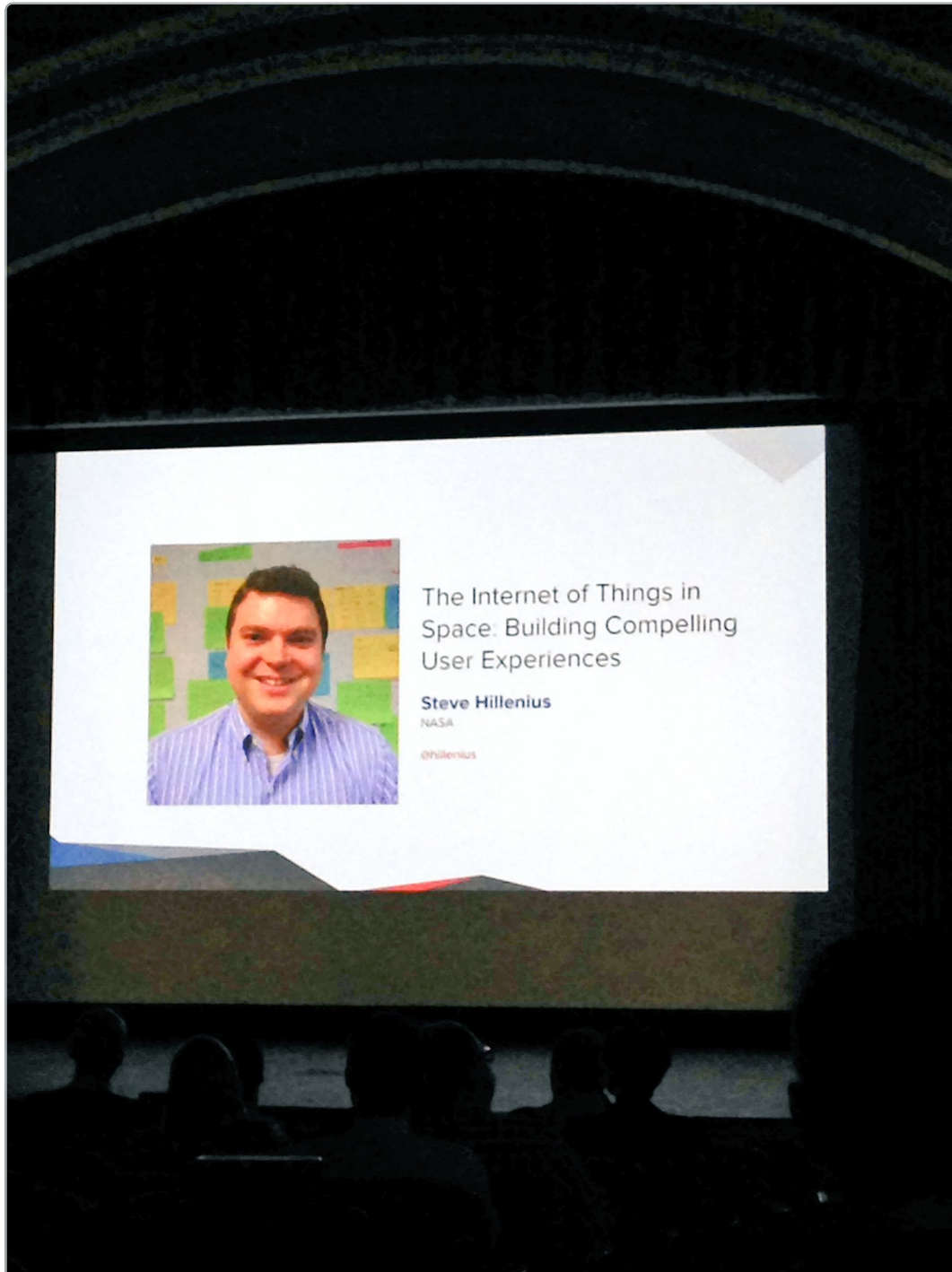


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The Internet of Things in Space: Building Compelling User Experiences by Steve Hillenius

NASA! Steve works for NASA and he came in to tell us about how the Internet of Things is progressing in space.

by  Anne Gibson 6 months ago 9 Views



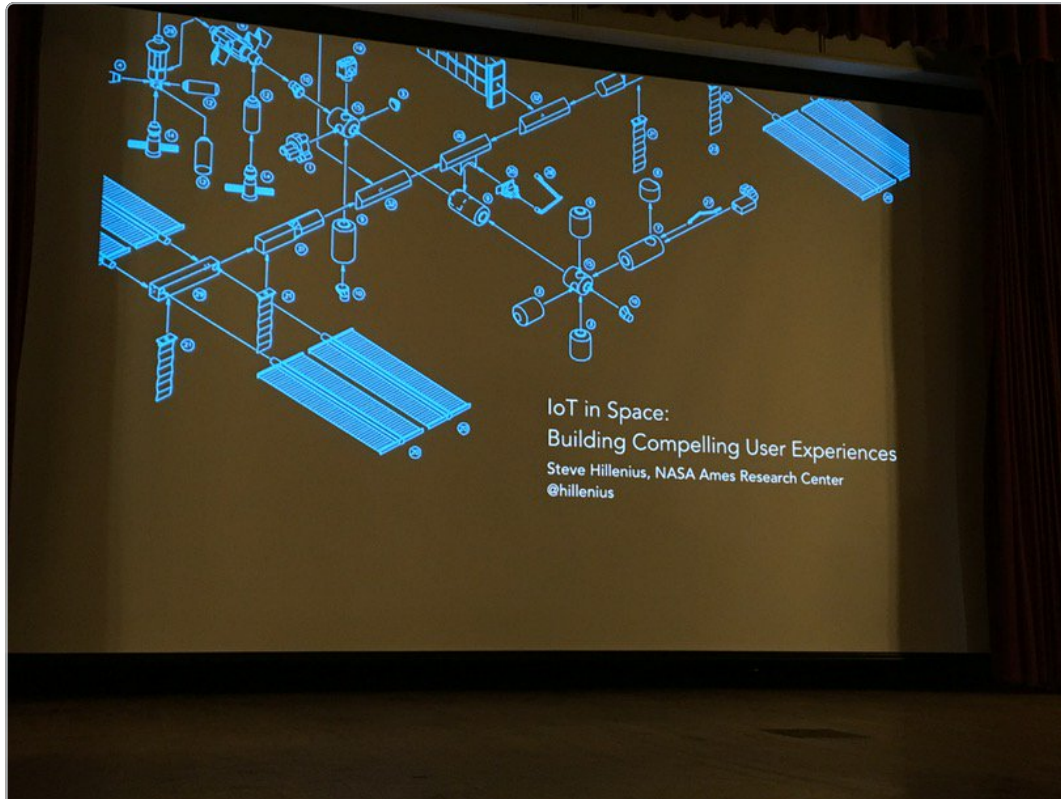
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Ready for an interesting session by [@Hillenius](#) on The Internet of Things in Space [#forgeconf](#)

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See [@hillenius](#) has a much more professional lead slide than I imagined ;) [#forgeconf](#)

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The state of the internet of things (iot): we're stuck in adding chips to existing things right now. Slot machine approach
[#ForgeConf](#)

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IOT is prolific. Smart vents, batteries, doorknobs, washing machines, pet trackers, etc. Everything. [#ForgeConf](#)

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Most of the IOT devices are unconvincing. We're increasing complexity on already existing things. Lack of convincing use cases [#forgeconf](#)

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A lot of devices aren't actually very interconnected. They work only in their own ecosystem or with their own app. [#ForgeConf](#)

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Once in a blue moon we get a clear user need and a clear product need, but the mobile UX is not good enough for the IOT
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Most of the things you own don't need a monthly service, internet connection, etc. We're not concerned a door lock will crash. [#forgeconf](#)

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'I need to reboot my door, lightbulb, etc.' is not something users want to hear [#forgeconf](#)

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"My door lock crashed" is catastrophic, "My phone crashed" is annoying. [#forgeconf](#)

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We tend to design what we know, and look at the world for what can be done. Not many IOT examples! [#forgeconf](#)

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You don't need to be able to build IOT but you need to be able to understand what can be built. [#forgeconf](#)

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Cole Kettler

@ColeKettler

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"The traditional mobile user experience is not good enough for the Internet of Things." - [@Hillenius](#) of [@NASA](#) at [@ForgeConf](#). [#ForgeConf](#)

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Smart Dust is where objects are ubiquitous and connectable enough that it's like dust, you don't even notice [#forgeconf](#)

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(I'm not sure I heard that one right so don't quote it.)



Brian Crumley

@briancrumley

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long term [#iot](#) [#ux](#) challenges... conveying intent to multiple devices, controlling devices interoperability, security - @Hillenius [#forgeconf](#)

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How do I convey intent to 1000 smart objects? How do I control them? Ensure interoperability? Security? [#forgeconf](#)

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We don't always think about security as being part of UX but having 1 device compromised could take down everything [#ForgeConf](#)

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How does IOT relate to NASA? Only few astronauts on a space mission, and mission control controls most of the ship [#forgeconf](#)

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We need astronauts to be more autonomous. Everything is done by procedures today. [#forgeconf](#)

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A lot can happen in the 6 months between the training on a procedure and the mission. They learn hundreds of procedures. [#forgeconf](#)

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Procedures used to be all paper all over the place. Now it's digital paper. Not much change really [#forgeconf](#)

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IOT - what if we could guide an astronaut to do procedures w/o training, and the object knew whether it was installed correctly? [#forgeconf](#)

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Stoked for the future of IoT + NASA [@Hillenius](#) [#forgeconf](#)

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NASA interns started the project. Cheap off the shelf components, accelerometers, haptics, augmented reality
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Initial idea: Track all the procedure objects and be able to tell where they were placed. Alert if installed correctly [#forgeconf](#)

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3 gains: 1. Nonlinearity execution instead of the paper list of steps. [#ForgeConf](#)

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2. immediate feedback on whether something was installed correctly [#forgeconf](#)

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3. Finding and locating objects. Things get lost constantly on the space station. Save hours of time [#forgeconf](#)

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Snags: indoor positioning is in its early stages. Astronauts wear a wristband to mitigate pickup detection [#forgeconf](#)

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Haptic motors on the wristband tell the user if they installed it correctly. Felt natural and convincing. [#forgeconf](#)

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Integrating augmented reality into the IOT system: not a requirement to interact, but a way to visualize the objects. [#forgeconf](#)

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Allows smoothing out the gaps so we can better visualize what the future will look like and how it will behave [#ForgeConf](#)

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How to design for a space with no gravity? Had to think about sensors, fusion techniques, UI overlays, how people moved. [#ForgeConf](#)

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Augmented reality: You can literally follow a path to where objects are in your room. [#ForgeConf](#)

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Augmented reality: You can lean in and see where an object can be located in any angle in 3D space. Nothing else can do that [#ForgeConf](#)

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This is an early working prototype in active development, but could work for autonomous astronauts in the future [#forgeconf](#)

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Demo shows picking up each item in turn until you collect everything, then takes you to next step in the procedure [#forgeconf](#)

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path planning [#iot](#) device prototype demo from [@Hillenius](#)! it looks like the holomap system from [@deadspace](#) game. amazing! [#forgeconf](#)

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3D overlay shows orientation of how things should be placed during the procedure. Moves to next step automatically [#ForgeConf](#)

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Jillian Bauer
@thesmallpicture

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"IoT is incredible powerful, but we've only scratched the surface of what's possible," -@Hillenius #ForgeConf

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Next: make the technology more robust. Investigate more indoor positioning techniques. Iterate! Open up new potential #forgeconf

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Dude I totally need this indoor positioning thing for my keys and the scissors #ForgeConf

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I really do. We own like seven pair of scissors for two adults and I still can never find any.



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NASA does a heavy amount of contextual inquiry and in stressful operationally realistic environments. Analog missions [#forgeconf](#)

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If it passes all the tests then they'll deploy to the space station [#forgeconf](#)

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What happens if something goes wrong? The procedures are very dense with contingencies, so the system can still provide those [#forgeconf](#)

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We always make sure to allow the astronaut to override something so that the human is still in control [#forgeconf](#)

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Historically in autonomous systems in mission control there's always been something that the system didn't know [#ForgeConf](#)

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Astronauts are trained to handle fires, coolant leaks, etc. but they don't code. They might plug in certain commands [#forgeconf](#)

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Are there challenges for low-gravity? More challenges adapting to space than low-g. Big headsets are a problem. [#forgeconf](#)

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Need the AR to not require someone to wear a big heavy headset 24/7. [#forgeconf](#)

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An accelerometer on earth is fine but the ipad's screen just spins in free-fall unless orientation lock is on [#forgeconf](#)

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Imagine if you were cooking and you needed a technique. Finegrained location detection could coach slicing, heating, etc. [#forgeconf](#)

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IOT will be able to teach people. (teach me to fix my plumbing please!) [#forgeconf](#)

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How much does science fiction inspire the problem solving at NASA? Definitely inspired a lot of that! Star Trek, etc. [#ForgeConf](#)

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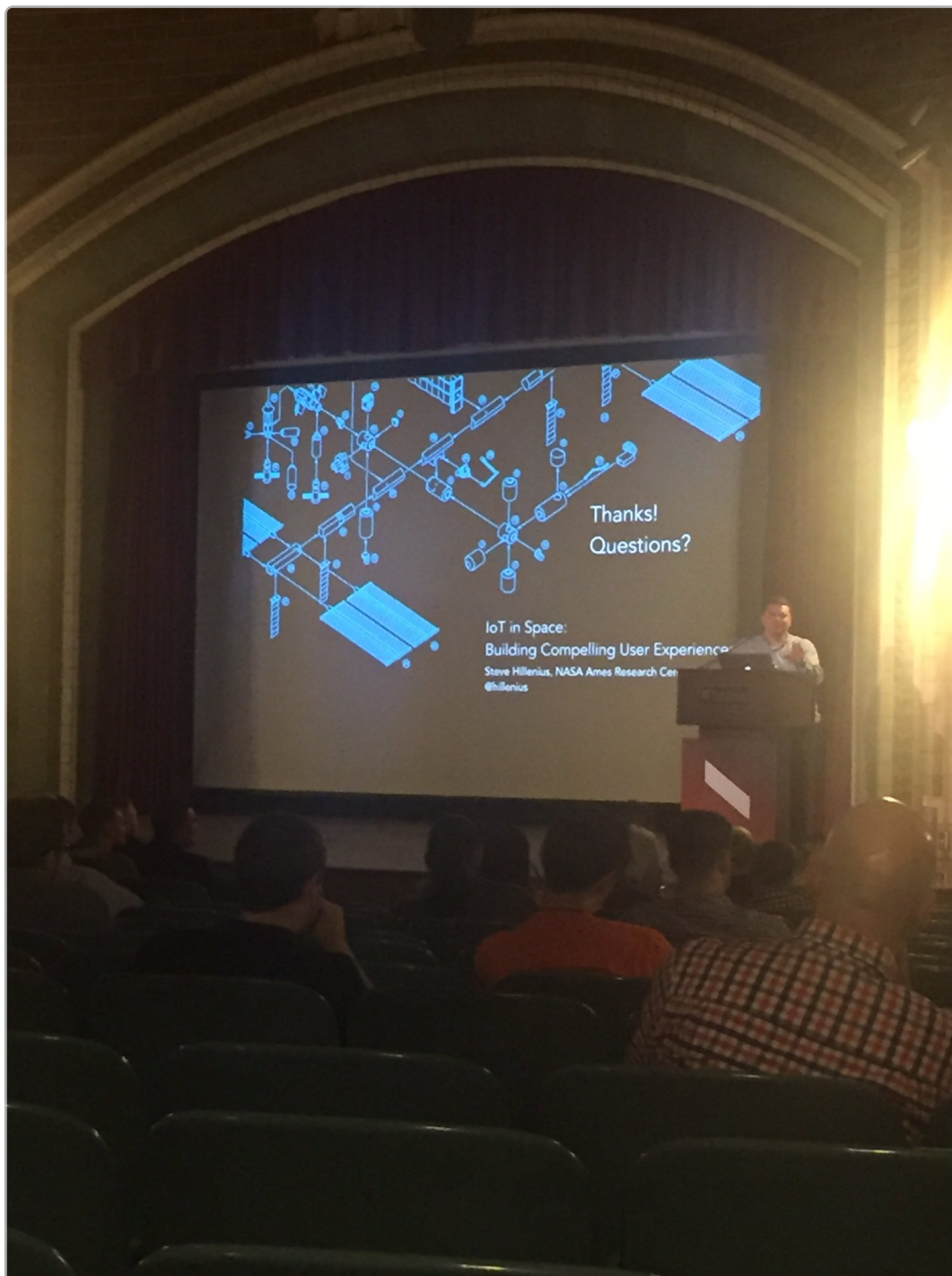
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A lot of movies have a really dark edge to things especially AI.
Not convinced AI is dark, could be a useful expert. [#ForgeConf](#)

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"Scifi inspires us to build new technologies. I'm not convinced it has to be dark." [@Hillenius](#) [#forgeconf](#)

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Also don't see AI fully in control of a system. Humans still provide the intent, otherwise we'll feel very vulnerable
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Overwhelmed by the vast number of things IoT could be used for, especially teaching and accessibility [#ForgeConf](#)

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"IoT can create a UX utopia or a UX nightmare - let's make it the utopia." [@Hillenius](#) [#forgeconf](#)

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