

## Google's Android ambitions go beyond mobile

By Mike Swift

[mswift@mercurynews.com](mailto:mswift@mercurynews.com)

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Andy Rubin, Google's (GOOG) top mobile-phone executive, likes to talk about everything being "Android-ized." Android has become the top smartphone operating system in the United States, but Google's ambitions for it go well beyond tablet computers and smartphones, even beyond the mobile Web.

With its forthcoming Google Wallet payment service, an Android smartphone will become a credit card. Now Google says Android can also become the first mass-market bridge between the virtual world and the physical world, allowing smartphone apps to control light bulbs, home

appliances, and even medical devices.

At its annual I/O developer conference last month, Google announced a program called Android@Home, a system that will allow Android phones and tablets to turn on household lights, activate speakers in a wireless stereo system, or analyze the calories burned on a gym exercise bike. The first Android@Home products are LED light bulbs embedded with technology that can be controlled by an Android device. Built by a Florida company called Lighting Science Group, they will go on sale by December.

But Android's executives say their ambition goes beyond turning a smartphone into a universal remote that could switch on the kitchen coffeemaker from your upstairs bedroom.

"These are fantastic

windows into the virtual world," said Joe Britt, the director of Android@Home, holding out a Nexus S smartphone during a recent interview at the Googleplex. "But that's the limitation, right? It's the

virtual world.

"Why not enable any physical device that exists to be influenced by or monitored by or controlled by a user, in a way that's as convenient as possible? And in doing that, because (Android is) a platform for applications, we enable a whole new universe of application types that developers can create."

Hoping to spark a wave of creativity similar to what Apple (AAPL) started when it opened the iPhone apps store, Google distributed hundreds of circuitry kits to developers at last month's I/O conference. The Android Open Accessory Development Kit (ADK) allows Android's software to operate and communicate with motors, sensors, controllers and relays, allowing developers to create an interface in which a smartphone app could control or collect data from a thermostat, a lawn irrigation system or a group of lighting fixtures.

"The opportunity exists to dramatically change how you control your home," said Tom Benton of Lighting Science. Over time, "we're talking about the elimination of the wall switch."

With more than 400,000 Android devices being activated worldwide every day and a global community of 450,000 independent Android software developers, Google hopes appliance manufacturers will be willing to embed the company's "Tungsten" control technology in their products, and that consumers will be willing to spend the money to buy Google's wireless control "bridge" that will connect individual appliances to an Android device through a home Wi-Fi network.

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"For many of these concepts, the stars need to align a bit in terms of critical mass," acknowledged John Lagerling, director of global partnerships for Android.

Google is hardly the first company to come up with the idea of a universal remote to control household appliances. IBM, Microsoft and other companies have promoted the idea, and a Southern California company called Smarthome has been designing, building and selling home control and automation products since 1992.

While the technology is not a major problem, Scott Burnett, director of IBM Global Consumer Electronics Industry, said "one of the looming issues for the industry is the business model -- how do I make money? -- whether from the perspective of the device maker, the service provider or others in the value chain."

Adding to the uncertainty about Android@Home is that Google has not yet revealed the device the wireless bridge network will use, nor its price. The initial LED lighting products, although far more efficient and longer-lasting than an incandescent bulb, aren't cheap -- LSG's household bulbs retail for about \$22 to \$35 each before energy rebates; the company has not set prices for those with the Android@Home technology added.

But by starting with the low-hanging fruit -- "Everybody can change a light bulb," Britt said -- Google hopes the payoff in energy savings, convenience and novelty will encourage manufacturers and consumers to jump onboard.

By throwing the door open to the creativity of independent developers, Google hopes to see software apps for the physical world just as ingenious as some of the hundreds of thousands of mobile apps for the virtual world that have been concocted in recent years.

Imagine, Android engineers say, a home alarm system that turns off automatically as you arrive home because your smartphone knows where you are. Or, Android developers could write apps to harness the computing power of the Internet cloud to reduce a home's power and water consumption.

"When the rainy season starts, the Internet knows when that is," Britt said. "We can automatically adjust how much water you're using. If you understand

when the most efficient time to use energy is, you can schedule times when your dishwasher runs or your washing machine runs. Those are the examples of control applications that, if wrapped in the appropriate user interface so they are very simple and transparent, this technology enables."

Far more ambitious apps are possible. Scientists at UC Berkeley are using the Android ADK to discover ways to help control mechanical "exoskeletons" that would support the legs of paraplegics, allowing them to stand and walk. Medical sensors connected to an Android smartphone could allow diabetics to monitor their blood sugar, or anyone to monitor their sleep patterns, Lagerling said.

Britt, who met Rubin when both worked for Apple two decades ago, has a pedigree in mobile-software technology. Rubin and Britt, along with Matt Hershenson, in 1999 founded Danger, a startup that created the T-Mobile Sidekick before Microsoft bought the company in 2008. Rubin left Danger to found Android in 2003, which Google bought two years later.

"I would come over here (to Android) to see Andy and Matt and have lunch, and the stuff they were working on was always extremely interesting to me, so last November I joined," Britt said. "I've been having a blast. It's a fantastic place. It's a crazy place in a really good way."

**Contact Mike Swift at 408-271-3648. Follow him at [Twitter.com/swiftstories](https://twitter.com/swiftstories).**

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