

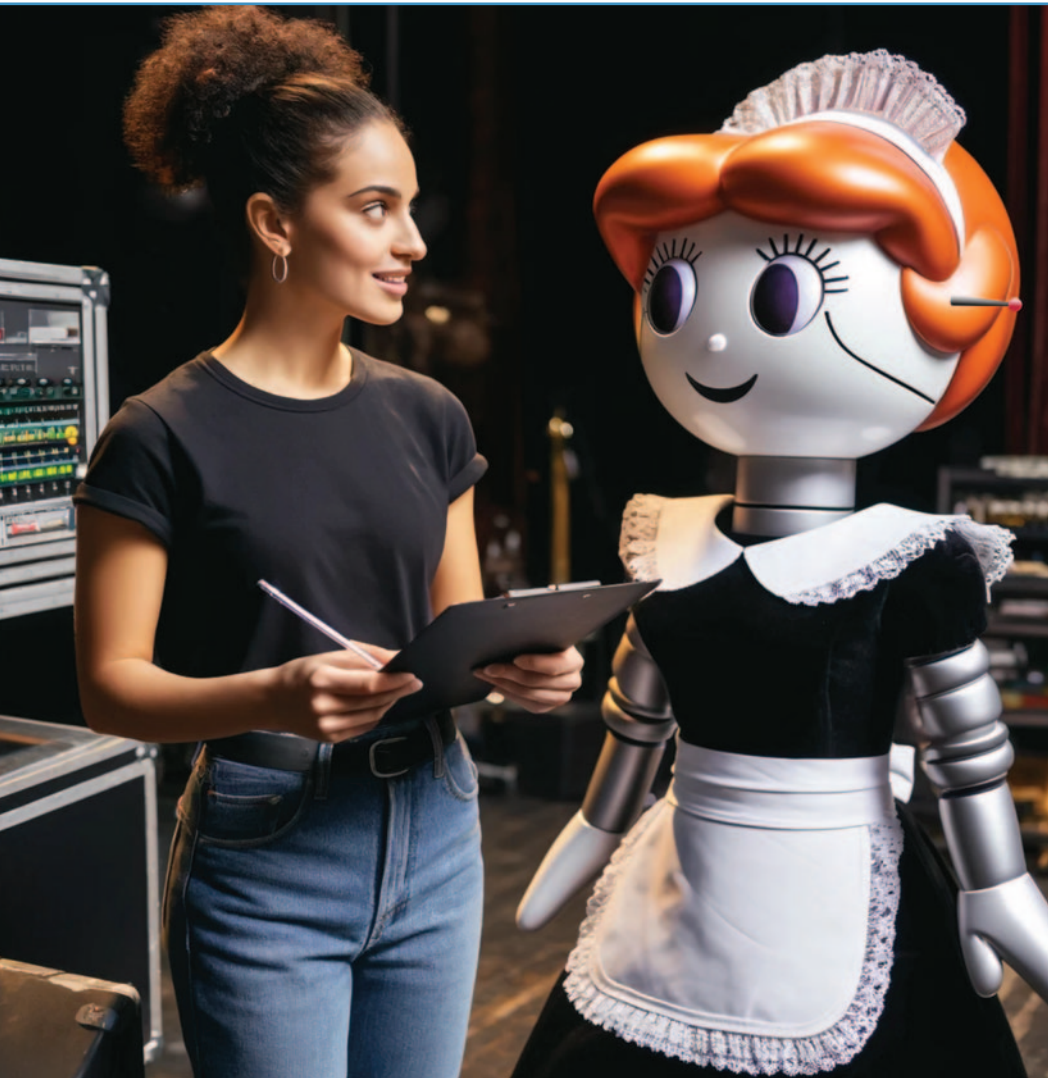
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# Whispering to the Robots

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## With NFC, you don't have to shout



Rosie the Robot, forerunner of NFC technology.

Whatever you think about robots, you can't say you weren't warned. Anyone who ever saw *The Jetsons*, the 1960s American cartoon from about living in the space age, knows that Rosie the Robot could wheel around the Jetsons' household and clean it entirely by herself. She was just as comfortable using a Hoover as a feather duster. So, we've known all along that

we were destined to have robots and robotic contraptions that could do everything for us. In live entertainment, we might not have domestic robots, but we do have robotic contraptions.

I always thought we would talk to our robots the same way we talk to humans, but if you take a close look at Rosie, you'll notice she has antennas where a human would have ears. This

indicates we were meant to send them wireless communications instead of voice commands. The lighting industry got that memo: We have wireless DMX that shouts at our robots from 100m or more and Bluetooth that speaks across the room. But near-field communication (NFC) whispers in the ears of our robots. It's not meant to shout or speak at normal volumes because we might not want just anybody to hear what we're saying to them. The industry is doing a lot more whispering these days because NFC is gaining ground.

NFC is a short-range wireless technology that allows the exchange of data between devices up to about 10cm apart. It was developed alongside Radio Frequency Identification (RFID), but RFID is unidirectional, so NFC was developed to allow two-way communication between devices. It requires some hardware and software, like a transmitter, receiver, and an app, to do its thing, and most smartphones and tablets have these transceivers built in. And now, a lot of stage and studio lighting fixtures have them, too. Entertainment lighting manufacturers are increasingly developing apps that allow you to whisper in the ear of their robots.

"Oh great," you say. "Another app. I need that like a need a hole in my head." That's what I used to think, too, until I realized that it's just another tool in the toolbox, and I've never not wanted that. So, I've embraced the concept and now I look forward to letting my pocket computer, aka smartphone, whisper to my robots, aka lighting fixtures, to set them up and configure them before installing them. Sure, I could use my handheld RDM controller, but then I'll need cables and maybe a male-to-male adapter. With NFC, I don't need any cables or adapters, and my phone is always in

my pocket. Now if I can just find that app in my haystack of apps...

There are lots of NFC applications in our industry. Rental houses use NFC to track inventory, and entertainment lighting manufacturers are developing apps to set up and configure our lights and more. ETC, for example, has the Set Light app for addressing and configuring fixtures wirelessly, and the ROBE COM app can be used to configure fixtures or to read the data in the company's Transferable Engines. Ayrton has an NFC app, Martin's is forthcoming, and I'm certain more will follow. These apps are typically available for Android or iOS. Several stage and studio lighting fixtures, including Martin's MAC Viper XIP; ETC's Source Four LED Series 3, ColorSource Spot V, and fos/4 Panel; Elation's Proteus Hybrid Max and Proteus Radius; Ayrton's Argo 6; and most Robe iSeries fixtures and FOOTSIE footlight range have NFC chips embedded in them.

You can also purchase NFC chips very inexpensively for your use. They come in the form of stickers so you can put them on anything. They are passive devices, each with a tiny NFC chip and an antenna, so they need no batteries; they draw their power through magnetic induction from the device that reads them. When a reader gets close enough, it energizes the tag and transfers the data to or from the chip using electromagnetic pulses, which represent zeroes and ones. You can erase them about 100,000 times, and they will keep the data for about ten years.

There are lots of uses for these stickers. A sticker can store useful data like a DMX address, DMX mode, IP address, subnet mask, or login and password data. (As of this writing, Apple, for security reasons, does not allow its products to use NFC tags to share network passwords. To share a network, you could use a QR code, which might work better for that application.) It can contain a URL, contact information, ASCII-encoded text, bina-

ry data, small images like an icon or a thumbnail, short audio files, and serial or phone numbers.

All you need is another app (again with the apps?!) that you can use to write to NFC tags. One of the most popular of these is NFC Tools, which is free and available for both Android and iOS. With it, you can read, write, erase, and format NFC chips or tags. The tags or chips are available to purchase online through several sources, including Amazon.

There are limitations with NFC, the most obvious probably being the amount of data that can be stored on a chip and the rate of data transfer, which is slow compared to Wi-Fi or Bluetooth. NXP manufactures the widely recognized NTAG series of NFC chips, including the NTAG213, which stores about 144 bytes of usable memory; the NTAG215, with about 504 bytes of usable memory; and the NTAG216, with about 888 bytes of usable memory. How much useful information does that represent? For ASCII-encoded text, each character is one byte, so an NTAG216 could store about 888 characters. If the text is unencoded (UTF-8 encoding), each character can be one to four bytes, depending on the complexity, so the same tag could store from about 222 to about 888 characters. As an example, this phrase is only 43 characters: "I'm sorry Dave, I'm afraid I can't do that."

Another consideration is the limited range, from about 4cm to about 10cm. But this is as much of a feature as it is a bug. It's a feature because it prevents the general public from reading or writing to a device when you don't want them to, so it's built-in security. There are also possible issues with electromagnetic interference and shielding or reflection from metallic surfaces.

NFC will continue to evolve, and more devices in entertainment will become NFC-enabled. The technology is simple but effective for whispering to robots. 🤖