

A BETTER BARCODE

by **Martin** Vilaboy



BOKODES OFFER A NEW SOLUTION FOR GREEN COMPONENT LABELING

A provider of sustainable or eco-friendly gear and apparel can do everything in its power the right way. Product components could be sufficiently biodegradable or renewable, sourced from local and ethical suppliers, and the gear produced at a low-waste manufacturing facility powered by alternative energy.

When it's time to take the product to market, however, a quandary still could exist as to how to convey all that product history and information to the consumer on the sales floor.

It's a very important and complicated question, since a green piece of gear often looks no different than one made through more traditional methods. All the while, several surveys suggest that one of the biggest barriers to consumers plunking down extra dough for a sustainable product is an inability to substantiate green claims at the point of purchase. About one

in three consumers, according to figures from Opinion Research Corp., say they don't know at all how to tell if green product claims are true.

So far, the challenge has been tackled by placing the added socially conscious messaging and information on packaging and hangtags, a method that may be somewhat effective but is completely counter to a movement that looks to reduce or eliminate packaging and printed peripherals. And in some cases, the sheer amount of information required to describe the details of that corn-based zipper pull attached to a sustainably farmed hemp jacket sewn by indigenous family members in a South American village and treated with low-impact dyes and water repellency simply may be too much to convey on a hangtag or rack signage that also needs to convey the features and functionality that drive the consumer to the item in the first place. Fortunately, an innovative new solution to the problem is coming



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into focus, though its inventors may never even have considered it for this specific application.

Last summer, researchers at the Massachusetts Institute of Technology's Media Lab Camera Culture group unveiled a new technology, dubbed "bokode," for encoding information and subsequently tagging products. It has been touted as a replacement for the ubiquitous barcodes but actually represents a lot more and, in some ways, something completely different.

At the core of the matter, associate professor Ramesh Raskar and his team at the Media Lab essentially developed a new way of communicating data optically. Until now, there were three methods of doing so: through ordinary imaging (using two-dimensional space), through temporal variations such as a flashing light or moving image (using the time dimension), or through variations in the wavelength of light (used in fiber-optic systems to provide multiple channels of information simultaneously through a single fiber), explain the MIT researchers.

Bokodes, meanwhile, encode data in the angular dimension, so rays of light coming from the new tags vary in brightness depending on the angle at which they emerge.

What makes bokodes significant to this discussion is the fact that these tiny labels of just 3 millimeters across hold thousands of times more information than the traditional barcode, up to 10,000 bits of information. And whereas barcodes require a laser

nutritional information or various product reviews, says Raskar, or could detail the carbon footprint or eco-evolution of a product and its components. The encoded data on the bokode also could include a link to information and materials online.

Consider, for example, a bokode serving up a link to a site along the lines of Patagonia's *The Footprint Chronicles*, where a shopper deciding whether or not to spend a few extra bucks on an environmentally conscious jacket can see exactly what it is that makes it "green."

"Barcodes are for machine interaction," says Raskar, "not for humans." When developing the bokode, the Media Lab team wanted to find a way to encode information "so that the information is more useful for humans," he says.

In their current incantations, the bokode tags are expensive to produce – about \$5 each – in part because the early prototypes require a glass lens and a powered LED. However, the researchers believe the technology could be refined so that tags are reflective and require no power.

"We already have prototypes which are completely passive," says Ankit Mohan, one of the MIT researchers behind the work. In this form, a bokode could cost around five cents each, he added.


Still, even at a lower cost, replacing a system as firmly entrenched as barcoding would take a substantial amount of time. So the Media Lab researchers at MIT are focusing on completely different applications for the new tags, and there are many possibilities.

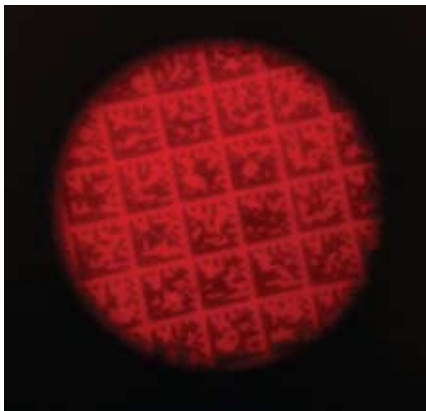
In addition to serving up detailed product information, the bokode tag could be placed on a tiny keychain-like device, for example, held by the user and scanned by a camera in the front of a room. This would allow multiple people to interact with a displayed image, such as in a classroom or at a business presentation. The camera could tell the identity of each person pointing their device at the screen, as well as exactly where they each were pointing, explain researchers from the Media Lab team. This could allow everyone in the room to respond simultaneously to a quiz, letting a teacher know instantly how many people, and which ones, got it right and thereby knowing whether the group was getting the point of the lesson.

Bokodes also could be applied to medical bracelets, to serve up patient information in an emergency; they could be used in situations such as museum exhibit labels, where the tiny codes would be unobtrusive and not detract from the art or other exhibits but could send a whole host of background information to the viewers' cell phone, says Raskar.

A tiny bokode on the outside of a restaurant, meanwhile, could serve up a menu to a passerby on the sidewalk.

This wide array of applications, says Raskar, hopefully will create enough critical mass among the various participants to develop standards that ultimately will push adoption along.

It doesn't seem so far-fetched. After all, how could a billion mobile phone cameras be wrong? 



Using an out-of-focus digital camera, the data stored in the Bokode chip can be easily detected, even from a few meters away. Photo courtesy Media Lab Camera Culture group



The Bokode device, at center, is much smaller than other types of barcodes, yet can contain far more information. Photo courtesy Media Lab Camera Culture group

scanner to work, bokodes can be read with a standard camera.

Keep in mind, unlike checkout and price-checking scanners that generally reside at fixed locations within a store, "everybody now in their own pocket has a camera; about a billion people in the world have a camera in their pockets," says Raskar, referring to the camera capabilities that now come standard on most mobile phones. "We thought, maybe it is a good time to rethink how we are going to interact with tagged information."

In the retail environment, a shopper would take a picture of the bokode, which would appear as a tiny red dot on a product or packaging. The mobile phone camera would then decode the information and display it to the consumer. That information could be local, placed directly on the dot, and include