



## Barcodes

Barcodes are a kind of machine-readable text, with each number from zero to nine represented by a pattern of black and white lines. For example, the number one is represented by a thick white stripe, a thick black stripe, a thin white stripe, and a thin black stripe. You can think of barcodes as Morse code for computers. When a laser scans the series of lines, the black lines absorb more light, telling the scanner what numbers are represented. The very first barcode was introduced in 1974 on a pack of Wrigley's Juicy Fruit gum, <sup>2</sup> and barcodes have only grown in popularity from there.

- **How barcodes can help your business:** 48% of small businesses do not track their inventory or use a manual process.<sup>3</sup> Barcodes can be a low-cost and efficient way to manage your inventory, helping reduce errors and improve your cash flow.

## QR (Quick Response) codes

You can think of QR codes as an expansion of barcodes where both the vertical and horizontal placement of black dots are read by an optical scanner. This expansion from one dimension to two allows for characters as well as numbers to be encoded in QR codes—and means about 100 times more data can be stored on them. The first QR code was used within the car manufacturing industry in Japan in 1994, and expanded to the public from there in parallel with the growing popularity of smartphones capable of scanning them. <sup>4</sup>

- **How QR codes can help your business:** Websites are the second most popular marketing tool used by small businesses.<sup>3</sup> QR codes can be an effective and inexpensive way to drive new traffic to your website, boosting the effectiveness of both your online and print marketing efforts.

## RFID (Radio-Frequency Identification)

If barcodes are in a sense one-dimensional data, and QR codes are two-dimensional, then you can think of RFID tags as a three-dimensional code. Instead of laser scanners for barcodes and optical scanners for QR codes, RFID tags use radio waves to transmit the information stored in them. Because of this, RFID scanners don't need to directly see the tags (have line-of-sight). Instead, they simply need to be in close proximity to the tags. A good example of this is when you use a wireless toll payment system in your car. Thanks to the ease of scanning RFID tags, they allow for more flexibility and automation in inventory management. Modern tags can even be as small as a grain of rice. <sup>5</sup>

- **How RFID tags can help your business:** While barcodes and QR codes are often less expensive than RFID, there are a number of cases where RFID may provide a better ROI. For instance, in RFID the data can be encrypted to provide enhanced security, the tags can store much more data than other methods, and RFID tags can be read all at once, rather than one at a time, by the scanner.

New applications for scanning technology are being introduced all the time. ;HP Proximity Card Readers read RFID tags in an employee's security card to protect confidential documents by releasing print jobs only to the right user. Building permits in New York City are now required to use QR codes that provide additional information about the project.<sup>6</sup> And barcodes have never wavered in their popularity, even becoming something of an artform. But no matter what use you have for scanning technology, the companies that take advantage of any of its forms have a clear advantage over those that don't. Now that you've learned the basics, what will your company do next?

[1] Wired, [\*\*All NFL Players Are Getting RFID Chips This Season\*\*](#)

[2] Chicago Tribune, [\*\*40 years ago today: Wrigley gum the first product to have its bar code scanned\*\*](#)

[3] Wasp Barcode Technologies, [\*\*State of Small Business Report\*\*](#)

[4] Denso Wave, [\*\*History of QR Code\*\*](#)

[5] AR Media, [\*\*RFID tag as small as a grain of rice\*\*](#)

[6] TechCrunch, [\*\*New York City To Put QR Codes On All Building Permits By 2013\*\*](#)

\* Int.J.Computer Technology & Applications, [\*\*Comparative study of Barcode, QR-code and RFID System\*\*](#)