The Age of Robots

In December 2013, *Wired* magazine published an article written by Kevin Kelly, titled “Better Than Human: Why Robots Will—And Must—Take Our Jobs.” In it, Kelly argues that we will soon see a wave of robots take over most of the jobs that people are doing today, just as most farm work disappeared during the Industrial Revolution. “Yes, dear reader, even you will have your job taken away by machines,” he writes. “Robot

replacement is just a matter of time."

The transformation from humans doing tasks to robots doing them, Kelly writes, "is being led by a second wave of automation, one that is centered on artificial cognition, cheap sensors, machine learning and distributed smarts." His claim that 70 percent of the jobs people are now doing will be lost to robots set off some heated discussion on Internet bulletin boards. But I think Kelly is right that robots are going to have a big impact on jobs and society over the next 20 or 30 years.

The two big advantages that humans have historically had over robots are their ability to recognize what is happening around them and make decisions about what to do in response. Kelly is right to say that these advantages are being eroded. He never mentions radio frequency identification—perhaps he considers it to be "cheap sensors." But it is clear to me that RFID and vision technologies (the ability of machines to analyze video and interpret what they "see")—combined with computing power that is becoming massive and cheap—will enable robots to interact with the world as never before.

RFID and vision will give robots the ability to see and react to the real world. Current industrial robots have highly scripted routines: Pick up a specific item that will always be in precisely the same place, and attach it to that component in exactly the same way. But imagine if robots could roam around racks within a manufacturing facility, read RFID tags on 50 slightly different items and pick out the right one every time? That would allow for a level of customization that

could not be accomplished cost-effectively today. Humans make errors, picking up the wrong item from time to time. Robots reading RFID tags and following computer instructions, however, would get it right 100 percent of the time—provided the instructions were coded properly.

Mobile robots equipped with RFID readers could do all kinds of jobs that humans must do right now. A robot could locate the correct pair of shoes for a customer from among thousands of pairs in a store's back room. It could also pick up the right dishes in the kitchen and bring them to the correct table in a restaurant (guided by RFID tags in the floor, real-time location technology, or vision systems). Robots, could, in fact, be programmed to cook food at most restaurants.

RFID will be important to robot development, because it provides an inexpensive way to distinguish between items that look very similar, or to just locate, identify and pick items. Vision will be important in recognizing human faces (your hotel concierge might soon be a robot), navigating environments with other humans and movable obstacles, and precisely executing tasks. A robot would likely use RFID to identify a part and then utilize vision systems to ensure that component was affixed in precisely the right place on an assembly line. And it would likely employ vision technology to identify the customer in a retail store who asked to see, for instance, a pair of size 10 Nike sneakers in a different color.

Kelly suggests that the age of robots will be as dramatic a transformation as the Industrial Revolution or the computer age, with massive shifts in jobs. He could be right. Businesses will need to adapt—and so will all of us.

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