

# Bright Idea

The inventor behind the light-emitting diode, **Nick Holonyak Jr.** devised a new way to light up the world

**I**n the February 1963 issue of *Reader's Digest*, Nick Holonyak Jr. made a bold prediction — that one day, light-emitting diodes (LEDs) would replace the incandescent lightbulb. “I knew it could happen,” says the inventor of the first visible LED. “I just didn’t know how and when.” Forty-five years later, early adopters are finally switching from compact fluorescent lightbulbs to LED equivalents that can last 4,000 hours longer and use as little as half the energy.

Holonyak, who turns 80 this month, is the inventor most responsible for this technological leap. A professor of electrical and computer engineering at the University of Illinois, Holonyak was inducted into the National Inventor’s Hall of Fame in Akron, Ohio, in May. The honor serves as an exclamation point on an impressive career that already included awards such as the National Medal of Science and the National Medal of Technology, and more than 30 patents for inventions including the dimmer switch and the laser diode used in CD and DVD players, in addition to the LED.

No lightbulb moment inspired Holonyak to become an inventor, however. Both of his parents were immigrants who toiled in low-level jobs to make ends meet. “Neither of them ever set foot in a classroom,” Holonyak says. “So they valued education.”

During high school, Holonyak worked on the railroad, putting in 10-hour shifts, six days a week. He later enrolled in the University of Illinois, where he earned his bachelor’s, master’s, and PhD, all in electrical engineering. In 1952, while working on his PhD, Holonyak landed a spot in the lab of John Bardeen, the future two-time Nobel Prize winner in physics, and became one of the first engineers to work on semiconductor devices, the precursor to modern-day computers.

In 1961, after rival inventors created LEDs that emitted infrared light, the race was on to develop an LED that gave off light in the visible spectrum. Holonyak was the first to make silicon glow with red light, in 1962, while working at General Electric. And his methods are still in use today. “We’re not throwing in energy and then using some intermediate steps to generate light,” says Holonyak. “We’re putting the current directly into the crystal, and the electrons and the ‘holes’ [essentially, gaps in the electron current] make a quantum process and generate light directly.”

Holonyak returned to academia in 1963 to teach at his alma mater, and he’s still there, conducting research. Over the years, his students have pushed the technology further, making LEDs in colors, shapes, and sizes that Holonyak once only imagined. “They’re making some of the most advanced LEDs out there,” he says. That may be so, but from the bright lights of Beijing to the glitz of the Las Vegas strip, the world wouldn’t be as bright if Holonyak hadn’t lit the way.

— *John Patrick Pullen*

