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Purdue Team Triumphs By Doing It the Hard Way

By Mark Fitzgerald

For over 50 years the cartoonist Rube Goldberg (1883-1970) satirized technology by drawing outlandish contraptions designed to perform simple tasks. The humorous mechanisms he fashioned were a “symbol of man’s capacity for exerting maximum effort to achieve minimal results,” he once said. Indeed, his art became so ingrained in American culture that the dictionary even made his name an adjective—*Merriam Webster’s Collegiate Dictionary* defines “Rube Goldberg” as follows: “accomplishing by complex means what seemingly could be done simply.”

In 1948 he won the Pulitzer Prize for his political cartoons, but Goldberg, who majored in engineering at the University of California Berkeley before becoming a fulltime artist, was known mostly for his “inventions” of absurd causal sequences that culminate with the completion of some mundane, everyday task, such as, squeezing an orange or shutting a window. In a cartoon he called “Pencil Sharpener,” a kite tied to a small door is flown out a window, causing the door to open and thereby release hungry moths that proceed to eat a red flannel shirt that is suspended by a pulley and tied to boot. The boot triggers a switch that heats an electric iron that burns a pair of pants, producing smoke that ascends through a hole in a tree and causes a possum there to flee by leaping

into a basket hung from a branch with a rope whose other end is tied to a cage. The lifting of the cage frees a woodpecker that ultimately pecks at a pencil to expose its lead.

It's ironic that Goldberg made his mark by poking fun at the very discipline he once studied, but it's fitting that the legacy he left behind—a multitude of high school and college courses and contests throughout the world that bear his name—invokes the capriciousness of his engineering aesthetic so readily. On April 9, in West Lafayette, Indiana, Purdue University held its 22nd Annual Rube Goldberg Machine Contest, a competition that brought together engineering students from colleges and universities throughout the nation to develop a machine that in 20 or more steps could remove and install two batteries from a flashlight before turning it on. The winning team, the Purdue Society of Professional Engineers (PSPE), completed the task in 125 steps, employing an outer space theme that featured a toy rocket, a water balloon, fish hooks, and a rotating auger.

“We had a whole storyboard sequence for the machine,” explains Devin Keeler, a senior civil engineering student at Purdue University. “In one of the storyboards, a comet lands on the planet Rube and starts a fire. Well, in order to put out that fire, a water balloon comes cascading down a track and falls into a cylinder full of fish hooks, which pop the balloon, causing the water to drain into a cup that's attached to a fulcrum that tips something else, and then it goes on from there.” Completing by far the largest number of steps, the PSPE's complex apparatus beat six other machines making it to the final round.

This is the third year in a row that an engineering team from Purdue University has won the contest. Last year's winning team, the Purdue Student Chapter Society of Manufacturing Engineers, developed an election-themed machine that used 70 steps to select, mark, and cast a ballot. In prior years engineering teams participating in the contest have developed Rube Goldberg machines that—as circuitously as possible—have toasted bread, made a cup of coffee, turned on a radio, stuck a stamp on a letter, and the list goes on.

“First and foremost it's got to work,” Keeler points out. “We took a lot of risks, and there are one hundred twenty-five steps, but if it doesn't work, you could have a forty-step machine that would still beat us. So, yeah, we had some risky steps, but we tried to do them in a controlled environment while giving them the ‘wow-factor’, and

then, on top of that, we tried to make it look pretty.”

Comprised of 11 engineering students from various engineering disciplines—mechanical, electrical, nuclear, computer, and civil—the PSPE’s team spent more than seven months working on the machine, the total person-hours put at 4,000. “I specialized in the wood construction,” says Keeler. “But we had insight from a lot of different angles. Some of the electrical things we do on the machine are incredible, and I’m just amazed that some of my buddies are able to do that stuff.”

On April 15, Keller’s team demonstrated their machine on *Jimmy Kimmel Live*, a late-night program on ABC that has previously featured such celebrities as Robin Williams, George Clooney, Britney Spears, and Quentin Tarantino. “This is a lot different than just opening up a textbook and studying theories,” observes Keeler who, after graduation, plans on working for Dewbery, an engineering, architecture, surveying, and planning firm headquartered in Fairfax, Virginia. “You get to actually see what you can do and you discover what the real setbacks are and learn how to overcome them. It’s a lot problem solving and a lot of teamwork—but a great project for a bunch of engineers to get together on.”