

Bot Man

by Bobby Oerzen

Robotics expert Grant Imahara uses his knowledge of physics to bust myths.

Have you ever compared a clumsy friend to "a bull in a china shop?" Then you haven't been watching *MythBusters*. "We put two, three, four, five bulls in the china shop, and they only knocked over one plate!" says Grant Imahara. "Amazing!"

Imahara is one of the co-hosts of the popular Discovery Channel TV show that tests the validity of old sayings, rumors, movie stunts, and Web videos. An electrical engineer by training, Imahara uses his knowledge of applied science to predict the outcome of the tests before the myths are busted-or, more likely, blown up.



MythBusters

Grant Imahara steered a bus via remote control from the back of a pickup truck.

Imahara has also predicted how long the Energizer Bunny will keep going and going. That's no myth. That's robotics, his other job. Imahara is also a robot builder and an *animatronics engineer*, someone who designs lifelike robots for movies and television.

Born an Engineer

Imahara's love of engineering began early in life. "I've always been fascinated with how things work," he says. Instead of crashing his toy cars when he was a young boy, Imahara removed the wheels. "I took apart anything I could get my hands on."

Later, at age 10, he got his first computer, which sparked an interest in electronics. "But it wasn't until high school that I realized you could get paid to make things work and that's called an engineer," says Imahara.

After getting a degree at the University of Southern California, Los Angeles, he headed across town to the movie industry. "Although it may look like all fun and games, it's really hard work," he says.

Imahara has worked as an animatronics expert on movies such as *The Lost World: Jurassic Park* and *Star Wars: Episode I The Phantom Menace*. "It's like I've given these robots a life and personality of

their own," he says.

Remote Controller

One of Imahara's early assignments was devising a remote control system for the Energizer Bunny. "We had to be very tricky and clever with how everything was arranged so the robot could beat the drum, move, and look like a bunny on the outside but still have a huge amount of go on the inside," he says.

Imahara later found himself in another tricky situation after joining the cast of *MythBusters*. One episode duplicated a stunt from *Speed*. In the 1994 action movie, Sandra Bullock pilots a runaway 10,885-kilogram (24,000-pound) bus over a 15-meter (50-foot) gap on an L.A. freeway.



MythBusters

The bus lacked the velocity to fly 15 meters through the air. It crashed instead, revealing that a similar stunt in the movie Speed was a special effect.

Because the stunt is extremely dangerous, Imahara had to guide the bus by remote control from the back of a pickup truck. The scene turned out to be a myth; the remote-controlled bus nose-dived off the test ramp into the asphalt below. Viewers may have been shocked, but Imahara wasn't. He knew the bus wouldn't clear the gap. "We use physics all the time to predict how things will work," says Imahara. "Everything we test adheres to the laws of physics."

Imahara identified all the *variables* in the test. A variable is a factor in an experiment that can change and affect the result. The variables included the bus's *velocity* (the rate at which it moved in a specific direction), the angle of the ramp, and the length of the gap. Gravity was also a factor, of course, but not a variable. Gravity is a *constant*—a factor that does not vary in specified circumstances. Gravity accelerates objects toward Earth at 9.8 meters (32 feet) per second, every second. With all the variables in mind, Imahara calculated that a bus reenacting the *Speed* stunt would miss clearing the gap by more than 9 meters. Which it did!

The Third Law

Imahara also used scientific reasoning during *MythBusters*'s duct tape show. In that episode, he and his co-hosts tested the legendary strength of duct tape. They wondered whether it is strong enough to withstand a cannon blast. The team fastened a block of duct tape to the back of a cannon and fired an 8-kilogram cannonball from it.



MythBusters

The MythBusters crew screwed duct-tape slabs of varying thickness to the back of a cannon and tested each one's ability to withstand the force of a cannon shot.

The variables in this experiment included the explosive force of the cannon-enough to launch the cannonball hundreds of feet at 257 kilometers (160 miles) per hour-as well as the duct tape. Each myth buster guessed how many blocks of inch-thick duct tape it would take to withstand a cannon blast.

Imahara made his guess using Isaac Newton's *third law of motion*: To every action there is an equal and opposite reaction. In other words, the force propelling the cannonball forward is matched by a force of the same size pushing the cannon backward against the block of duct tape.

Imahara calculated that it would take 3 solid inches of duct tape to withstand the cannon's mighty blast. His calculation was a little off; it took only 1 inch!

Regardless, Imahara remains confident of the predictive power of physics. "Pop singers come and go, but the laws of physics never change," he jokes. "Gravity-you can always count on gravity."