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Cool Jobs: Math as Entertainment

This is one in a series [1] on careers in science, technology, engineering and mathematics made possible by support from the Northrop Grumman Foundation

Article by: Dana Mackenzie [2]

How to realistically destroy a fake building

To compute how a virtual building should collapse on-screen in a convincingly real way, Bin Zafar uses engineering, computer skills and a toy familiar to most kids. Yes, he starts by pretending the building is made of Lego bricks connected by springs. (He actually keeps a box of Legos — the regular kind without springs — in his office for inspiration.) The virtual Legos form the large chunks into which the building crumbles, while the virtual springs simulate the forces that would act on the building. Once the building starts to collapse, Bin Zafar then ensures that the thousands of computer-drawn pieces fall in a realistic way, without their passing through each other — something that would immediately spoil the illusion of reality.

Although Bin Zafar instructs his computer program to apply the laws of physics in most instances, he also knows when to bend them. This was especially true in *Madagascar 3*. “We do things like change gravity’s direction all the time,” Bin Zafar says. “In a cartoon,” he explains, “it’s quite reasonable for a character to start walking up a wall — and yet have everything look natural.”

As a kid, Bin Zafar was a big fan of cartoons and movies. “*Looney Tunes* were my favorites,” he recalls. He also loved the original *Tron*, a movie that came out in 1982. Watching it “was the first time I realized, as a child, that the things you see in a movie didn’t have to be real.” Imagine his thrill at being asked to work on the film’s sequel, 28 years later.

Bin Zafar points to two important skills he has needed to work in a digital movie studio: communicating effectively and solving word puzzles.

Communication is critical because creating visual effects is a team job. When Bin Zafar writes a computer program, he also has to explain the program to the animators who use it. “My work makes things look believable, but it really takes an artist to make things look spectacular,” he says.

Solving word problems is almost as important, Bin Zafar notes, because requests are never described in numerical terms. Instead he gets: “And then Los Angeles sinks into the ocean.” It’s his job to translate that request into the language of mathematics, so that a computer can render it into believable images.

In the exciting environment in which Bin Zafar works, the distinctions between artist and mathematician often blur: Artists need to understand math and the mathematicians need to understand art. Says Bin Zafar: “We’re all exploring our imaginations together.”

For the original article, please click here [3].

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