PAVAN KHENGRE

# TOY STORY

**For over three decades, Arvind Gupta has been fashioning interesting contraptions from scrap to teach children scientific principles**

ROHAN SWAMY

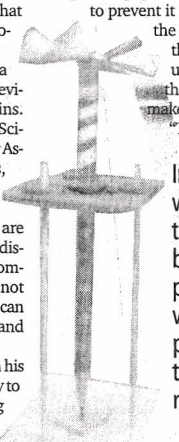
HE is a modern-day science teacher in the mould of Aamir Khan's character in *3 Idiots*. Professor Arvind Gupta is working with a rubber slipper, six circular magnets, a pen and an old compact disc. Within minutes, he has managed to fit four magnets and a piece of the CD into five slots on the slipper and slipped the remaining magnets on the pen, suspending it on the magnets with their poles repelling each other. The tip of the pen touches the CD so that once it is given a slight twirl, the pen keeps rotating for several minutes.

While a spinning pen may sound like a simple toy, this very principle of magnetic levitation is used in superfast Maglev trains. Gupta, a visiting scientist at the Children's Science Centre in the Inter University Centre for Astronomy and Astrophysics (IUCAA), says, "Some of the toys we make here demonstrate complex high school physics and chemistry theories in simple ways. They are created from local junkyard materials like discarded bottles, cycle valves, bamboo broomsticks, etc. This way, we tell children that not only is science easy and fun to learn but they can also make the toys themselves to understand these principles," he says.

An alumnus of IIT Kanpur, Gupta began his career in 1975 with an engineering firm, only to quit in 1978 to work full time on teaching children scientific concepts. "The whole concept of explaining science to children using fancy, expensive equipment felt so dull when I began teaching that I felt it was illogical," he says.

One of his most simple and endearing scientific toys is a simple pencil fan, made from an ordinary pencil with an eraser at the top, a pin, a small piece of foam, and a piece of paper. Gupta takes a pencil and cuts notches along its length—from the eraser end half way down—before fixing the pin in the rubber, followed by the piece of paper and finally a tiny ball of foam to prevent it from flying away. Holding the contraption between his thumb and index finger, he uses a ball point pen to rub the notches vigorously to make the fan run full blast.

"This principle has left scientists perplexed. Six research papers have been written on the subject. Of course, it gets more complicated there, when they discuss the length of the total notches, the angles for their cut etc., but in a very simple way one can teach a child the cause and effect of vibrations on a body, and how it can generate energy powerful enough to rotate something," he says.



In this toy windmill based on the repulsive force between the like poles of a magnet, when the suspended pencil is given a twirl, it keeps rotating on its own

In his toy factory are generators built from nails and coils, pumps made of old camera film boxes and cycle tubes, centrifuge sprinklers made from straws and broomsticks. "This year we have made close to 700 different toys that explain concepts ranging from gravitational, centrifugal and frictional forces to the Newtonian laws. We have taught children in over 2,000 schools across 20 countries, and we have a lot more stuff to come up with," he says.

One of his inspiring designs is the draw-and-feel slate, a tool used to teach blind children. Built from a spool of wool that is cranked up and kept in an old camera reel, an empty ball point pen, and a slate with a Velcro top, the simple tool has been used to explain various forms and structures to visually-impaired children for over ten years now. "A child can draw whatever shape he chooses to on the Velcro board using the wool, and can then feel its shape," Gupta says.

Five hundred of his toys have been documented. "We have uploaded close to 125 short films in eight different languages on the Internet," Gupta says, and adds that he hopes children find them interesting.

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