

Watch our film, *Clearing the Air*,  
at [shell.co.uk/realenergy](http://shell.co.uk/realenergy)



[New Scientist](#) | [Space](#) | [Technology](#) | [Environment](#) | [New Scientist Jobs](#) | [Subscribe to New Scientist](#)

# NewScientistTech



## SEARCH

**Go** > [Search Tips](#)

### HOME

### STORIES

'Crash-tested' skulls throw light on extinctions [NS](#) [6](#)

IBM creates working racetrack memory device

Nanoscale freighter hauls its first load

Yahoo flirts with Google to avoid Microsoft deal

Hurricane simulator to bring the house down

### TECHNOLOGY BLOG

### INVENTION BLOG

### VIDEO

### SPECIAL REPORTS

### SUBSCRIBE

### SEARCH

### FEEDS

### PRINT EDITION



> Current issue  
> Archive  
> [NS](#) Full Access

### NewScientist.com

> Curious cloud formations linked to quakes  
10:40 11 April 2008

> Ocean mud yields secrets of past Earth impacts  
20:28 10 April 2008

> IBM creates working racetrack memory device  
19:00 10 April 2008

### NewScientistSpace

> Ocean mud yields secrets of past Earth impacts  
20:28 10 April 2008

> Soap bubbles recreate Jupiter's turbulent storms [6](#)  
17:40 10 April 2008

## Nanoscale freighter hauls its first load

19:00 10 April 2008  
NewScientist.com news service  
David Robson

A nanoscale "monorail" that can creep along a nanotube track has shifted its first load, hauling a gold nugget a distance of 0.5 micrometres. The device could be a useful addition to microscopic construction toolkits that researchers hope will advance computing and other fields.

The new device developed by researchers in Spain, Austria and Switzerland is made from two nanotubes nested like the parts of a telescope.

The central tube is one micrometer long and acts as a rail for the second, smaller, 200-nanometre nanotube. The outer "monorail carriage" is driven by applying current to the inner rail, and can move in both directions along the rail – it can also rotate around it.

In trials, the device was used to transport a ball of gold about 250 nanometres wide along the track for a distance of 500 nanometres (0.5 micrometres). It moves at speeds ranging from 0.1 nanometres per second to 1 micrometre per second. The researchers observed the motion using an atomic force microscope.

### Range of movement

"It is the first nano-freighter train," says [Andrea Ferrari](#), an expert in nano-engineering from the University of Cambridge, UK, who was not involved in the research.

Previous nanomotors could only rotate around one axis. The monorail's greater range of movement provides another mechanism for scientists searching for ways to work with nanoscale components as they would with larger objects in a conventional workshop.

The monorail is driven by the heat energy from the electric current flowing through the nanotube, says [Adrian Bachtold](#) from the Institut Català de Nanotecnologia in Barcelona, Spain, who worked on the device. When the current is applied a temperature gradient forms, leaving the middle of the rail nanotube at more than 1000 °C, with either end at just 27 °C.

### Minimal friction

Computer simulations showed that vibrations travel from the hot to the cold areas, carrying the monorail with them. At the moment, the monorail nanotube can only move towards the ends of the rail nanotube from the centre, but the team are working on giving it a reverse gear.

The device was made by zapping carbon-rich material with electricity to grow an initial pair of nested nanotubes. The team ran a large electric current through, making the outer layer come free from the one nested inside. They then burned off most of its length to create the shorter, free-moving monorail carriage.

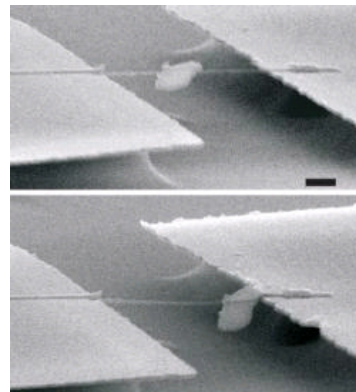
"The beautiful thing about this device is that the friction between the two nanotubes is very small – the surfaces are almost atomically smooth," says Bachtold.

Ferrari was impressed by the work, saying it advanced previous demonstrations of nanotransport. "However, this is just a first step and significant research and development work is needed to make this a real technology."

Journal reference: *Science* (DOI: [10.1126/science.1155559](https://doi.org/10.1126/science.1155559))

**Nanotechnology** - Follow the emergence of a new technology in our continuously updated [special report](#).

PRINT SEND RSS FEEDS SYNDICATE



[Enlarge image](#)

A nanoscale "monorail" shifts cargo along a track made from a single nanotube, scale bar 300 nm (Image: Science)

### Tools



### Related Articles

[Nano-transport controlled by heat-sensitive polymer](#)  
25 August 2006

[Nano-car gets an engine](#)  
14 April 2006

[Soldering iron added to nano-toolkit](#)  
28 April 2004

[Search New Scientist](#)  
[Contact us](#)

### Web Links

[Adrian Bachtold, Institut Català de Nanotecnologia](#)  
[Andrea Ferrari, University of Cambridge](#)

## Subscriber Login

username:   
password:

Your login is case-sensitive

**Log in** > [Help](#)

> Forgotten your password?  
> Subscriber? Register now!  
> Subscribe now  
> Institutional Subscribers  
> Athens login


## Subscriptions

Know more for less  
**only £24/quarter**  
when you subscribe

**SUBSCRIBE NOW**



> [Subscribe](#)  
> [Renew](#)  
> [Change address](#)  
> [Customer service](#)  
> [Free E-Zine](#)  
> [RSS](#)

> Smallest exoplanet may have been found   
16:32 10 April 2008

**Explore by Subject**

- > Health
- > Fundamentals
- > Being Human
- > Living World
- > Opinion
- > Sex and Cloning

Comment subject

Comment

No HTML except  
lower case italic tags  
or lower case bold  
tags, please:  
<i> or <b>

Your name

Your email

We need your email in case we need to contact you about the comment. We will not use it for any other purpose.

**Submit**

All comments should respect the [New Scientist House Rules](#). If you think a particular comment breaks these rules then please use the "Report" link in that comment to report it to us.

If you are having a technical problem posting a comment, please [contact technical support](#).



- For exclusive news and expert analysis every week [subscribe to New Scientist Print Edition](#)
- For what's in New Scientist magazine this week see [contents](#)
- [Search](#) all stories
- [Contact us](#) about this story
- [Sign up](#) for our free newsletter