

A new 3D scanning machine may speed up security at airports

A better picture

Queuing, unpacking and repacking our suitcases is the price of airport security. Suitcases go through an X-ray and any suspicious image means the luggage is sent on to a second machine, but a new 3D scanner may speed things up. It was the result of a collaboration between a global company, Rapiscan, and a team led by Bill Lionheart, Professor of Applied Mathematics at Manchester University. The idea is that the bags could have a three-dimensional scan and be viewed from any angle, allowing the security people to get a much better idea of the contents of a piece of luggage much faster. 'They had invented it to make it very fast,' says Professor Lionheart, 'but they hadn't thought about how to make the three-dimensional picture. Because you are getting the view from lots of different directions, you have to put it together to make a three-dimensional volume. Then you can look at it in any direction you like but some mathematics goes in between.'

Real time

So Lionheart and his team created an algorithm which meant the operator of the scanner could see the object in 3D in real time. The resulting machine, the RTT80 (Real time Tomography) 3D scanner won a prestigious *Engineer magazine* prize and has been tested in the US and in Germany with a view to being put into production if it meets the necessary standards. The mathematics they've used for the scanner is also a starting point for other applications. Rapiscan also make metal detectors which made Professor Lionheart think that there are perhaps new ways of thinking about anti-personnel mines.

Landmines

'It's not a problem we have in the UK,' says Lionheart, 'but in the Far East and Africa, it will take hundreds of years to clear the mines. We are hoping that this metal detector project will lead to projects where we can clear up landmines much quicker.' Lionheart believes that mathematics is particularly good at working across different engineering problems. 'You start looking at X-rays in airport security, then apply the same things to material science, inventing detectors, and you realise the same mathematics could be applied to landmine detection. We tend to make bridges across different disciplines because the mathematics is shared.'