

Would you like your Mum to know exactly where you are, every second of the day? Well, now she can, if you wear a 'buddi' satellite tracking device, invented in 2007 by Sara Murray. You can even get 'petbuddis', too!



The buddi relies on the Global Positioning System (GPS). But GPS wasn't invented to track teenagers!

For many years, the US military used compasses and sextants to navigate – just as Muslim sailors had for centuries before them. But in the 1960s, the US military wanted to a method that was quicker and easier to use. They decided to develop a satellite system. The army, air force and navy came up with designs and ideas. By 1973, the best ideas had been incorporated into the final design of NAVSTAR GPS.

## Before GPS...

More than a thousand years ago, Muslim sailors used astrolabes to pinpoint their position. Meriam al-Ijli, a woman engineer, manufactured many high quality astrolabes in Aleppo-Syria. She died in 967, age 23.

## How is GPS useful?

The US military originally wanted to keep GPS to itself. It uses GPS to deliver weapons to their exact targets, and for navigation.

But in 1983 a South Korean aeroplane flew the wrong way. The plane was shot down, killing all 269 people on board. This tragedy influenced US President Reagan's decision to announce that anyone could use GPS.

Now, people use GPS to:

- navigate in cars, aeroplanes and boats
- help in emergency and rescue work
- find out what's happening in earthquakes
- track animals for scientific research
- track offenders, sons, daughters and pets

## How does NAVSTAR GPS work?

GPS has 24 satellites that orbit 20,000 km above Earth. The satellites transmit radio signals. At any one time, everywhere on Earth receives signals from four or more satellites.

The radio signals from a satellite give its position and the time the signal was sent. A receiver picks up the signals. The receiver works out the time taken for a signal to get to it. The receiver knows the speed of the radio signal. So it calculates its distance from the satellite using the equation:

$$\text{distance} = \text{speed} \times \text{time}$$

At the same time, the receiver calculates its distance from two other satellites. It uses these distances to work out its location to within a few metres.



## What's the future for SATNAV?

In 2007, GPS was the only working satellite navigation system. It is controlled by the US military, who can switch it off at any time. Soon, Europe, India and China will all have their own systems.

Ships still have compasses and sextants on board, just like the ones that Muslim sailors used and improved over 1000 years ago. Modern ships use them as a back-up to GPS... they don't need electricity and the US military can't switch them off.