

Random Numbers from Space

The concept of randomness, and creation of random numbers, has been part of human culture for thousands of years; in fifth century Athens, they considered elections undemocratic, everyone was considered equal and they selected people at random from the population to serve as the government. Perhaps our current politicians should take note, although the principle itself still exists in the UK through jury duty selection.

Random numbers are integral to modern society, from the obvious betting and gambling arenas, to sport, science, the arts and cryptography – all those little devices used to log into bank accounts are based on random numbers; in addition, they're key to satellite communication systems.

Computerised random number generators have been around as long as programmers have programmed, and their algorithms produce a series of numbers that look random, but in fact they aren't as they have a predetermined sequence. These are known as pseudo random numbers and are fine for many uses, but aren't suitable to applications like secure communications or cryptography; for these we need to create true random numbers.

A true random number is one whose outcome is unpredictable, for example rolling a dice. Whilst this works for a single true random number, what if you want thousands or millions? Building a machine to throw millions of dice simultaneously isn't sensible, instead random numbers are created using a physical property of the environment applied through a computer, for example decays in radioactive sources, snapshots of lava lamps or atmospheric noise caused by lightning strikes within thunderstorms. Last Thursday night would have been a goldmine to anyone using this methodology, as over 3,000 lightning strikes hit the country within three hours.

The space sector is now becoming involved in this area. In [last week's blog](#) we reported on the two UK satellites recently launched; the UKube-1, built by Clyde Space in Glasgow, carries a true random number generator. The JANUS experiment will test the feasibility of using cosmic radiation to create true random numbers by detecting impacts from space particles through the single event upset effect methodology.

This could offer an alternative method of creating high volumes of random numbers for the communication and cryptography industries particularly, and gives one more way in which space can help.

Blog written in conjunction with Adam Mrozek, work placement student.