

Mini cameras for nano-satellites

CEI researchers have developed an innovative miniaturised imaging and radiation damage experiment for the UK Space Agency's diminutive spacecraft, UKube-1, the UK's first national Cubesat.

Typical camera systems on satellites weigh 10s to 100s of kilograms. However, when the entire mass of your satellite can weigh no more than 4kg, some innovative thinking is required to deliver the best performance. CEI researchers have achieved just that with their Compact CMOS Camera Demonstrator (C3D) instrument for the UKube-1 satellite weighing only 170g.

Built by Scottish space firm, Clyde Space, UKube-1 is a nanosatellite conforming to the Cubesat spacecraft standard. It's roughly the same size as a small loaf of bread box (at 10 x 10 x 30 cm), can run off the same power as an energy-saving light bulb (at 20W) and is about as heavy as a new born child (at 4kg). However, even with these modest specifications, it packs the full complexity of sub-systems and payloads as its larger, and considerably more expensive, cousins relying on mobile phone-type advanced technology than the more qualified older technology of its larger relatives.

C3D mirrors the complexity of its host spacecraft by supporting three e2v 'Eye-on-Si' CMOS imaging sensors in a payload designed to demonstrate the technology's performance in the harsh environment of space. Each sensor serves a unique purpose. The first acts as a radiation damage monitor (RDM), capturing the effects

space radiation has on the sensor. The second is attached to a lens and acts as a wide field imager (WFI) able to capture pictures of the Earth at a resolution of ~350m, whilst the third is attached to a telescope and acts as a narrow field imager (NFI) able to capture images for the Earth at an ~25m resolution. It also hosts RADFET and thermometry for housekeeping

Through the development of C3D and the radiation work on e2v CMOS sensors, CEI researchers have demonstrated the technology's readiness for imaging instruments operating on the surface of Mars and around Jupiter's moons system.

For further information please visit our website: www.open.ac.uk/cei

