LITTLE ROBOT DUCKS AND DODGES

Drones fitted with a type of motion-detecting camera can dodge obstacles ten times faster than current drones equipped with conventional cameras.

Self-flying drones have commercial potential for capturing aerial imagery and delivering packages. Current drones capture images from a camera and use algorithms to identify moving objects, a process that can take several hundredths of a second. This relatively slow reaction time makes today’s drones vulnerable to collisions with birds and other items.

Davide Falanga and his colleagues at the University of Zurich in Switzerland fitted four-rotor drones with devices called event cameras. Instead of recording images or video frames, an event camera outputs a stream of data points triggered whenever a camera pixel detects a change in environmental brightness; such changes correspond to movement or other disturbances in the surroundings. The team’s algorithm also adjusted for the drone’s own movements.

The researchers tested the drone’s reaction time by throwing balls at it. The drone could perceive and begin to dodge the ball in just 3.5 milliseconds, significantly faster than drones using conventional cameras and image analysis.

Sci. Robot. 5, eaaz9712 (2020)

WHY A GLASS OF WINE GENTLY WEEPS

The mysterious phenomenon called ‘tears of wine’ is produced because of shock waves within the film of wine that climbs the side of a glass.

After wine is poured into a glass and swirled, a thin film of the liquid creeps up the glass. This happens because the alcohol in wine evaporates faster than the water, and the resulting difference in surface tension pulls the wine upwards. Gravity soon tugs the wine down in a flow of tear-shaped drops, whose formation has been unexplained.

Andrea Bertozzi and her colleagues at the University of California, Los Angeles, identified shock waves that might be the missing piece of the puzzle. As surface tension and gravity battle, they create unstable shock waves in the thin wine film. The shocks propagate upwards, pushing the liquid’s front into a scalloped shape, which culminates in the large droplets that trickle downwards as tears.

To reliably generate these tears: pour whisky or port into a conical glass, immediately cover the glass to stop evaporation, swirl the liquid slowly to coat the glass and remove the cover after a few seconds when the swirl disappears.

Phys. Rev. Fluids 5, 034002 (2020)

ASTONE-AGE LARDER MADE OF BARE BONES

A 25,000-year-old structure made from the bones of woolly mammoths might have served as a giant food pantry for prehistoric humans.

Eastern Europe is dotted with mammoth-bone rings, which have been interpreted as the remnants of Stone Age dwellings. In 2014, archaeologists discovered one such structure (section pictured) at a Russian site called Kostenki that, at 12.5 metres in diameter, is one of the largest ever found. It was created from the remains of at least 64 mammoths, reports a team led by Alexander Pryor at the University of Exeter, UK. Detailed excavations of the structure suggested that humans burnt wood fires within it.

But the structure held only small quantities of debris from the manufacture of stone tools and almost no animal remains other than those of mammoths — suggesting that humans did not use the structure as a long-term base camp. Its large size would have made it difficult to cover with a roof, say the researchers. They suggest that ancient humans might have used the structure to store food instead.

Antiquity http://doi.org/dp6h (2020)

HOW VAPE INGREDIENT TURNS TOXIC

A highly toxic gas produced by the breakdown of a particular e-cigarette additive might have a role in lung injuries affecting vape users.

Since 2019, an epidemic of severe lung injuries has sent more than 2,800 vapers to hospital in the United States and caused 68 deaths in the country. Previous work has tentatively linked many of the cases to vitamin E acetate, an oily liquid added to the vaping mixture in certain e-cigarettes. But the definitive cause of the outbreak has not been found.

Dan Wu and Donal O’Shea at the Royal College of Surgeons in Ireland, Dublin, analysed the chemical decomposition of vitamin E acetate when it is heated in a vaping device. Modelling, mass spectrometry and isolation of individual by-products showed that when exposed to high temperatures, vitamin E acetate can release the gas ketene, which the authors call “exceptionally toxic”. In animal studies, ketene has been shown to damage the lungs and impair the central nervous system.

The results show that more attention should be paid to unexpected substances produced by heating e-cigarette ingredients, the authors say.

Proc. Natl Acad. Sci. USA http://doi.org/dp6g (2020)