

# Motion-capture helping reveal how kangaroos hop

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(PhysOrg.com) -- Scientists in Australia, the UK and US have for the first time used infrared motion capture technology outdoors to work out how kangaroos distribute their weight and the forces as they hop along.

The researchers, [Dr Alexis Wiktorowicz-Conroy](#) of the Royal Veterinary College in London and colleagues in the US and Australia, used an array of outdoor cameras at the Alma Park Zoo in Brisbane, Queensland, to

record reflected infrared light from highly reflective ball markers stuck onto the fur of kangaroos. High-speed [video cameras](#) were also used to record the movements.

The same kind of motion-capture technology is used in sports studies such as analyzing golfing swings, and has also been used in movies such as the Lord of the Rings to translate the motions of actors onto animated creatures. The technology is usually used indoors to avoid the [infrared light](#) from the sun, but the fiber-optics company Vicon developed a motion capture system that can be used outdoors and allowed the researchers to borrow the equipment.

The researchers also had the kangaroos hop on a series of force plates, which measured the forces exerted by the [kangaroo](#)'s feet onto the ground.

One aim of the research is to understand how kangaroos change their body posture and the mechanics of their hopping in different sized species of kangaroo. Many animals become more upright as their body size increases, but kangaroos do not. At slow speeds kangaroos use their tail rather like a fifth limb, but at faster speeds they hop and can bounce along at high speeds and long periods without changing posture and apparently without fatigue.

Dr Wiktorowicz-Conroy said the team want to understand how even large and heavy kangaroos can hop so fast and not change posture. Scientists have not yet been able to explain how large kangaroos can do this without their bones breaking. She said other scientists were looking at their ankle joints but their research was focusing more on the other joints in the hind limbs.

The infrared motion capture system records the same kind of data that can be obtained by analyzing high-speed film frame by frame, but does

it automatically. The system has provided the researchers with large amounts of data, which they are currently analyzing.

Dr Wiktorowicz-Conroy said the data should help them solve at least some of the biomechanical puzzles and increase their understand more about animal location and especially hopping.

Their preliminary findings show the kangaroos' movement is highly efficient at conserving energy, and they use their tails as a counterbalance while hopping, which reduces the energy expended.

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