

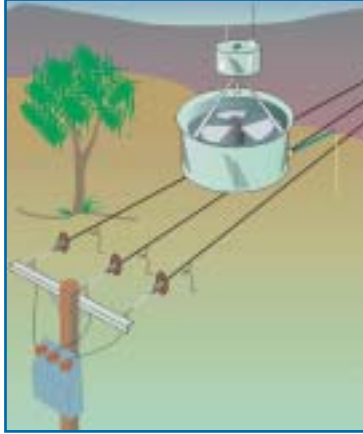
Autonomous rotorcraft for power line inspection

With the help of a Global Research Award, Dr Dewi Jones from the University of Wales, Bangor worked for 12 months at CSIRO (Commonwealth Scientific and Industrial Research Organisation) in Brisbane, Australia. He conducted a feasibility study on the use of a small, electrically-driven rotorcraft for inspecting overhead power lines with emphasis on methods for control, guidance and autonomous capability.

Using unmanned aerial vehicle systems (UAVS) for power line inspection has advantages over current methods, including economy, data quality and more frequent coverage. Dr Jones and colleagues have proposed using a ducted-fan rotorcraft operating close to the overhead line, obtaining its electrical power via a pick-up mechanism. The vehicle's on-board battery power is limited, effectively tethering it to the immediate vicinity of the line. This is an advantage when preparing a safety case to allow autonomous flight beyond the operator's visual range.

Researchers at CSIRO have constructed an Air Vehicle Simulator (AVS) – a hybrid-testing facility based on a cable-array robot. A computer model of the rotorcraft's dynamics generates velocity demands to the cable array so that the motion of the simulated vehicle within its 10x8x4 metre workspace mimics that of the real rotorcraft.

Dr Jones has been collaborating with CSIRO. The AVS has been used to test soft-



(Above) Artist's impression of the power line inspection vehicle in action. (Above right) The AVS 'pod' (the simulated rotorcraft) approaching the one fifth scale power lines under visual feedback control. (Inset) The cranked linkages of the pick-up mechanism fixed below the AVS 'pod'.

ware for controlling the rotorcraft's lateral position and height relative to overhead power lines, by means of an artificial vision-based system. Dr Jones has also designed and tested an experimental power pick-up mechanism, which uses force sensors to maintain contact with the conductors despite changes in the rotorcraft's position and attitude.

For information on the Global Research

Award Scheme please contact Dr Chris Coulter at The Royal Academy of Engineering (0207 227 0500; E-mail: chris.coulter@raeng.org.uk).

For further information on this project please contact Dr Dewi Jones at the University of Wales, Bangor (01248 382701; E-mail: dewi@informatics.bangor.ac.uk).