

CUHK Scholars the First Time to Win

IEEE Marconi Prize Paper Award in Wireless Communications

Prof. Zhang Yingjun Angela, her PhD student Dr. Qian Liping, and Prof. Huang Jianwei, all from the Department of Information Engineering at The Chinese University of Hong Kong (CUHK), recently won the prestigious IEEE Marconi Prize Paper Award in Wireless Communications for their paper entitled 'Achieving Global Optimal Solution of Non-Convex Power Control Problems'. It is the annual best paper award of *IEEE Transactions on Wireless Communications (TWireless)*, one of the most widely-acclaimed publications in telecommunications and the second largest IEEE transaction journal. The CUHK paper defeated over 1,700 entries and won the award which will be presented in the IEEE Global Communications Conference (GLOBECOM) to be held at Houston, USA in December. Only one original paper receives this top honour each year for its originality, utility and timeliness in the field of wireless communications since the inception of *TWireless* in 2002.

The paper was awarded for providing the best solution on optimal power control in wireless ad hoc networks, which has been an open problem of two decades in wireless communications. Wireless ad hoc networks have extensive applications in both military (eg. battlefield communications) and civilian (eg. emergency rescues in natural disasters) contexts. Proper power control enables wireless devices to efficiently share the spectrum resource, making possible the transmission of high quality videos and data. Although many approximate algorithms have been proposed to solve wireless data transmissions over ad hoc networks in the literature, this paper presents the best solution ever and the first global optimal power control algorithm, thus providing the critical benchmark to measure all existing and new approximate algorithms for this problem. In particular, the paper presents a mechanism to strike a trade-off between the computational complexity and solution quality, which is of prime importance for practical implementation.

Apart from the applications in wireless networking, the method introduced in this paper can generally be applied to tackle challenging engineering problems with non-convex but monotonic structures. It is very often that a hidden monotonic structure can be uncovered in these problems after appropriate transformations. The concepts and techniques expounded by this paper have pointed to many interesting research avenues beyond wireless networking.

The IEEE Marconi Prize Paper Award is granted on the basis of multi-round evaluations jointly organized by the IEEE Communications Society and IEEE Signal Processing Society. A total of 1,755 papers published in the previous three calendar years are eligible for competing the 2011 award of *TWireless*, which is the only IEEE's academic journal that exclusively carries wireless communications research papers. .