

RF transceiver IC design for satellite communications

PhD EPSRC 'CASE' Studentship

Supported by PHASOR

Applications are invited for a fully funded EPSRC Industrial CASE PhD Studentship to work with Professor Andreas Demosthenous, UCL Department of Electronic and Electrical Engineering, on RF IC design. The studentship is supported by the Engineering and Physical Sciences Research Council (EPSRC) and PHASOR, a leader in high-bandwidth, communications-on-the-move.

The studentship will cover Home/EU tuition fees and an annual stipend of no less than £17,280 increasing annually with inflation. The studentship is funded for 4 years on a full-time basis.

Studentship Details

High-throughput satellites (HTS) at Ku-band and Ka-band offer viable solutions with their larger available bandwidth. HTS were originally constructed, and are commonly used, in conjunction with stationary terminals as a fixed satellite service. However, mobile internet access, e.g. on-board aircraft, ships, and trains, has become increasingly important and because of platform movements, a tracking and steering mechanism is required to point the antenna beam toward the satellite. A common solution is complex mechanically steerable reflector antennas. These are bulky and increase the drag and operational cost of aircraft. The alternative is electronic beam scanning using phased array antennas. Compared with conventional mechanically steering antennas, phased array antennas could provide significant improvement, enjoying the benefits of flexible antenna pattern control and simultaneous multi-beam forming capabilities. Phased array antennas with multi-beam pattern could enhance the performance of wireless communication systems in terms of capacity, coverage, and throughput by spatial filtering. Therefore, phased array antennas have become an essential part of future mobile satellite communication systems. They offer low-profile and instantaneous scanning as no moving parts are involved. For the beam scanning, different techniques are used such as analogue beam forming and digital beamforming. Recently, the technically more advanced concept of digital beamforming has attracted considerable attention for communication at Ka-band frequencies.

Phased array antennas require application specific integrated circuit (ASIC) transceivers that accumulate and phase shift the received beams and transmit the phase-shifted beams. Design and implementation of high-performance transceivers for satellite communications in submicron CMOS or SOI technologies has many challenges. New techniques are required to achieve a sub-2dB noise figure (NF) while tolerating a high level of blockers. Frequency and local oscillator (LO) distribution need clever techniques to reduce the high-power consumption in such high frequencies.

UCL (University College London) is London's leading multidisciplinary university, with more than 13,000 staff and 38,000 students from 150 different countries. Founded in 1826 in the heart of London, UCL was the first university in England to welcome students of any religion and the first to welcome women on equal terms with men.

Phasor is a leading developer of high throughput, modular, digital, phased array antennas. Its electronically steerable antennas are based on patented innovations in dynamic beam-forming technologies and system architecture, and are being developed to provide unique product solutions for land-mobile, aeronautical and maritime satellite communication applications. Phasor's diverse, multi-skilled and innovative R&D team is based at its offices, labs and test facilities in central London. Here all aspects of the solution, including ASIC, antenna, RF hardware, electronics, mechanics and software are designed, developed, built and tested.

Based at the UCL Department of Electronic and Electrical Engineering, the studentship will be jointly supervised by Professor Andreas Demosthenous (UCL), Professor Bram Nauta (University of Twente) and Dr Hashem Zare-Hoseini (PHASOR).

Eligibility

The successful applicant should have, or expect to achieve, a degree (1st or 2:1) in a relevant subject, e.g. Electronic Engineering, Electrical Engineering, Microelectronics, Physics or similar. Applicants must meet the EPSRC eligibility conditions to be eligible for the award – in summary this typically means that applicants must have no restrictions on their right to live in the UK permanently and have been resident in the UK for three years immediately prior to the studentship commencing. EU Citizens who have not been residing in the UK for the past 3 years may be eligible for a fees only award. Please see EPSRC's website for further details:

<https://www.epsrc.ac.uk/skills/students/help/eligibility/>

Apply

Interested candidates should contact Prof Andreas Demosthenous (a.demosthenous@ucl.ac.uk) with a covering letter and a full CV (including contact details for at least two academic referees plus marks/grades achieved on current courses if applicable). The covering letter should outline your interest in and suitability for, researching the suggested topic.

This studentship is available to start from September 2019.