



IEEE Control, Aerospace and Electronic
Systems Chapter, South Australian Section



THE UNIVERSITY
of ADELAIDE

School of Electrical & Electronic
Engineering



Dr. Eli Brookner
Raytheon (Retired)
IEEE AESS Distinguished Lecturer

**Venue: Room 5.57 Ingkarni Wardli,
University of Adelaide**

Date: Tuesday 4th September 2018
4:00pm - 5:30pm
Refreshments provided from 5:30pm

**RADAR, PHASED-ARRAYS, METAMATERIALS, STEALTH, ANTI-STEALTH, ULTRA-
WIDEBAND, COGNITIVE ADAPTIVITY, MIMO -- ADVANCES AND BREAKTHROUGHS**

Abstract

RECENT AESA DEVELOPMENTS: Patriot upgrade to 2016 state-of-the-art AESA; S-band AMDR AESA radar provides 30X sensitivity of SPY-1D(V). **LOW COST PACKAGING:** AESAs using commercial-off-the-shelf (COTS) hardware and packaging. **EXTREME MMIC:** Whole 256 element phased array on single chip at 60 GHz. **DIGITAL BEAM FORMING (DBF):** Reduces search power and time by almost a factor of two; Makes cognitive radars realizable; enables ultra low antenna sidelobes; **MOORE'S LAW:** Potential future continuation of via Spintronics, Memristors, Graphene, Quantum Computing. **VERY LOW COST RADARS:** for cars, UAVs, watch cell phones.

METAMATERIALS: low cost 2-D ESAs for satellite internet communications (at 10-15 GHz); for cell towers, for cars, surveillance and UAV radars; how they work explained for first time; Stealthing by absorption and by cloaking (that is making target invisible); which cloaking techniques not useful; wideband fractal metamaterials; Army 250-505 MHz conformal antenna to replace tall whip antennas. **WIDEBAND LOW PROFILE ANTENNA:** 20:1 bandwidth.

COGNITIVE ADAPTIVE ARRAY PROCESSING (CAAP): Applied to barrage, hot-clutter and repeater jammers. Tremendous advantages over classical sample matrix inversion (SMI), principal component and diagonal loading adaptive processing. Sidelobe Cancelling (SLC). STAP and DPCA.

Speaker

Dr. Eli Brookner MEE & DrSc Columbia Un '55 & '62; BEE CCNY, '53. Raytheon 1962-2014 (retired); Principal Engineering Fellow; worked on radars for air traffic control, military defense, space & navigation: on ASDE-X, ASTOR RADARSAT II, AGRB, major Space Based Radar programs, NAVSPASUR, COBRA DANE, PAVE PAWS, MSR, COBRA JUDY Replacement, THAAD, SIVAM, SPY-3, Patriot, BMEWS, UEWR, SRP, Pathfinder, Upgrade for >70 ARSRs, AMDR, Space Fence, 3DELRR. Before Raytheon: Columbia Un Electronics Research Lab. [now RRI], Nicolet, & Rome AF Lab; Awards: IEEE 2006 Dennis J. Picard Medal for Radar Technology & Application; IEEE '03 Warren White Award; Journal of Franklin Institute Premium Award best paper, 1966; IEEE Wheeler Prize for Best Applications Paper, 1998; RCA Armstrong Medal 2017; 2017 IEEE AESS Outstanding Organizational Leadership Award. Fellow: IEEE, AIAA, & MSS. 4 books: Tracking, Phased Arrays & Radar. >10,000 attended courses in 26 countries. Banquet & keynote speaker 13 times. > 230 publications. > 100 invited. 6 papers in Books of Reprints. 9 patents.

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