AESS Distinguished Lecture Report

Mark E Davis, Foliage Penetration Radar

Presentations in Turkey and Australia August/September 2013

1. Summary: A series of Distinguished Lectures were given on Foliage Penetration Radar in Turkey and Australia, under support of Aerospace Electronic Systems Society, IEEE Region 8 and IEEE Australia. The timing of the two country visits was around the 2013 International Conference on Radar, in Adelaide Australia. This provided the logistics to provide an AESS DL to these interested IEEE Chapters with minimal cost. A short description of the benefits of membership in AESS and distribution of the AESS Pamphlet were provided at the sponsors and attendance statistics are summarized in the sections below.

Each lecture gave a three-part tutorial on foliage penetration radar. The first part covered an early history of battlefield surveillance enabled an ability to detect fixed and moving objects under dense foliage. The second part concerned synthetic aperture radar (SAR) that have been developed for both military and commercial applications. The last part discussed new research in multi-mode Ultra-Wideband Radar, with the design of both SAR and moving target indication systems.

2. Turkey IEEE Region 8. At the invitation of Dr Murat Efe, Mark Davis visited Turkey for lectures in Istanbul and Ankara. Dr Efe is the Chair IEEE AESS Turkish Chapter and a Professor in Ankara University, Faculty of Engineering. These two lectures were significant in satisfying the AESS Turkey Chapter’s requirements for two meetings during 2013. IEEE Region 8 supported the visits, and reimbursed the DL travel within Turkey and hotel accommodations.

The Lectures were given in the two locations:

27 August Istanbul Turkey: Dr (Col) Mustafa Ilarslan Director Aeronautics and Space Technology Institute, Turkish Air Force Academy (TAF) arranged the lecture held at the Yildiz Technical University (YTU), Davidpusa Campus. The attendance was 12 people, which was small due to both the Academy and University being on a term break. Attendance was from members of the faculty of both TAFA and YTU, and two members of the radar industry in Turkey. Approximately half of the
attendees were members of IEEE, and somewhat smaller AESS membership.

After the lecture, Dr Ilarslan hosted a lunch at YTU, which was attended by several of the lecture participants and Prof. Ahmet Turk, the Chair of the Electrics and Telecommunications Engineering Department. The attendees are pictured in Figure 1.

29 August Ankara, Turkey: The DL in Ankara was arranged by Drs Sevgi and Ali Gurbuz from TOBB Engineering Technical Üniversity (ETÜ), and providing the lecture venue. There were also attendees from Middle Eastern Technical University and Ankara University. There were 22 attendees, with half being members of IEEE, but only a third being AESS members. There was a positive move by several AESS members to attract the new members. Figure 2 shows Mark Davis presenting the lecture at TOBB ETÜ.

Professors Ali and Sevgi Gurbuz hosted Mark and Diane Davis by touring the country side around Ankara, including a visit to Bey Bazari, a small village that specializes in crafts and silver tooling. Figure 3 is a view from an old fortification looking into the village below. This was a very enjoyable departure from the big city environs of Istanbul and Ankara.

![Figure 2 Mark Davis presenting the FOPEN DL in Turkey](image1)

![Figure 3 Visit to Bey Bazari village](image2)

3. Australia FOPEN Distinguished Lectures: Joe Fabrizio from Australia Defence Science and Technology Organisation (DSTO) and the AESS VP Education arranged for two lectures in Australia, following the 2013 International Conference on Radar. IEEE Chapters in Brisbane and Melbourne Australia sponsored these visits. Both cities have active chapters and some industries supporting the Australian radar developments. Each of the participating Chapters funded the in-country flight to their city and the hotel accommodations.

The summary of these two lectures include:
13 September Brisbane, Australia: The coordination for the visit to Brisbane was provided by Dr Garry Einicke, Senior Principal Research Scientist, CSIRO Earth Science and Resource Engineering. CSIRO is an organization sponsored by the Australian Government for developing civilian and industry applications of technology. The meeting was hosted at Queensland University, which has an active radar curriculum focused on supporting the mining exploration and production. In addition to Dr. Einicke, there were 7 faculty and graduate students in attendance, plus one visitor who worked for the Australian Defence Department as a consultant. Four of the attendees were IEEE members, and only Dr Einicke was an AESS member. They did respond by taking the AESS brochures. This is an opportunity for better recruiting for IEEE in the Queensland region.

The subject of FOPEN radar is complementary to the ultrawideband radar used for monitoring wall deformation in mines. In addition, the High Frequency radars developed by Australia for long-range surveillance require the same attention to dispersive propagation. It was interesting to note that the foliage penetration radar is applicable to remotely inferring the health of forested areas. A range of open problems such as optimising antenna polarisation and antenna arrays were also discussed. This lecture generated several good questions for applying the AESS DL to their local needs.

16 September Melbourne, Australia: The final FOPEN DL was coordinated by Dr. Eddie Custovic, Vice-Chairman & Student Activities IEEE Coordinator, LaTrobe University, Victorian Section. This was the best attended of the four DL sessions, with 114 faculty and students in the audience, as shown in Figure 5. When I asked for a show of hands for IEEE membership, approximately half of the audience responded. However, when asked who were also AESS members, only a handful indicated membership. This is another area that AESS could be better served by recruiting from this
LaTrobe University has an active program supporting the DSTO in Adelaide. Dr. Costovic teaches a survey course in radar and communications technology. His entire course of 94 students was in the audience, and generated a wide range of discussion during and after the lecture. A short tea meeting was held in the university engineering offices for further discussions. In addition, I was given a tour of their laboratories, which is in the middle of developing digital waveform and beamforming technology for their DSTO sponsor. There is a significant overlap in technical challenges in the FOPEN radar and complementary communications and HF radar design.

4. Summary: I wish to express my appreciation to all of the host organizations who provided support of the AESS Distinguished Lecture on Foliage Penetration Radar. It took a significant amount of internal coordination to attract the local funding and attendance at these events. My logistics were very smooth in getting to and from the different universities, due in great part by my host’s personal participation. And finally, the matching finances by the hosts were provided immediately, greatly reducing the AESS administrative efforts.

I also want to thank Joe Fabrizio for working with me to establish the process for coordination of the logistics and matching funding for this AESS program. We trust that the benefits of this capability will be mutual to the Operating Units and AESS for future membership as well as attendance in AESS sponsored conferences.