The Institute of Electrical and Electronics Engineers (IEEE)

Co-sponsored by Galveston Bay Section

Joint Societies Chapter and LM-AG

ONLINE Virtual Meeting

Thursday, April 1st, 2021 11:00 AM- 12:00 AM US-CDT(Houston-Chicago)

TOPIC: "Inside Apollo: Heroes, Rules and Lessons Learned in the Guidance, Navigation, and Control System Development"

Speaker: Dr. George Schmidt **, IEEE AESS Distinguished Speaker ,** MIT Instrumentation Laboratory /Draper Laboratory (Retired)

Presentation:

Within the last few years, we celebrated the 50th anniversaries of Apollo 8 (Dec 1968) and Apollo 11 (July 1969). These 2 spaceflights were among the greatest explorations in the history of mankind. In Apollo 8, three astronauts deliberately put themselves into orbit around the Moon expecting the rocket engine to later thrust and bring them safely home to Earth. In Apollo 11, it was mankind's first landing on the Moon and establishment of Tranquility Base. We also celebrated the 50th anniversary of the dramatic Apollo 13 (April 1970) and this year Apollo 14 (Jan 1971) and Apollo 15 (July 1971) are celebrated. Movies, books, articles, and documentaries have covered the "space race" era in detail. The presenter will give his thoughts based on more than a decade involvement in the MIT Guidance, Navigation, and Control System (GN&C) program design, many hours in the Spacecraft Control room at Cape Kennedy monitoring GN&C performance through liftoff, and then providing real-time mission support to NASA Houston from MIT in Cambridge, MA. Some stories have not been told in public before. The talk is particularly focused on helpful lessons for being a successful engineer at any stage in one's career, and especially, when the project involves the safety of other's lives.

PRESENTER:- George T. Schmidt is a consultant in avionics, guidance, navigation, and control systems. He has previously served on the AESS Board of Governors as VP Member Services and is now VP Technical Operations. As an AESS Distinguished Lecture, he has lectured and visited chapters around the globe. He is the founding AESS representative to the annual Saint Petersburg Russia International Conference on Integrated Navigation Systems, now in its 26th year.
In 2007, he retired after 46 years at the MIT Instrumentation Laboratory and the Draper Laboratory, Cambridge, Massachusetts. His final position was as the Draper Director of Education. Prior to that position he was the Leader of the Guidance and Navigation Division and Director of the Draper Guidance Technology Center. He made an original contribution in the first application of Kalman filtering to the prelaunch alignment/calibration of the Apollo GN&C System which was used throughout the program. Now the technique is used in virtually all inertial systems prior to their mission. Later he developed the original motion compensation requirements for the first electronically agile radar operating in a SAR mode on a maneuvering aircraft. He worked on modifying an existing USAF inertial system to integrate with an EAR during successful B-52 flight tests. Virtually all high-resolution radars now have a motion compensated SAR mode for mapping and/or weapon delivery. Then he led a USAF study that defined the cruise missile carrier navigation system requirements for future strategic aircraft. Many of the recommendations were later implemented in the B-2 aircraft and in the stealthy Advanced Cruise Missile of which over 400 were built. He then developed highly successful relative targeting techniques for GPS/INS that were adopted by the military. All these contributions are documented in seminal papers and reports. He was a member of several important US government study teams, including the influential Defense Science Board Task Force on GPS that helped define GPSIII.

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Since 1968, he has participated in the panels of the NATO Science and Technology Organization (STO), formerly AGARD. This included several recent Lecture Series dealing with inertial, GPS, and integrated navigation systems in denied and degraded environments. In 2005 he received the STO's highest technical award, the von Kármán Medal. In 2013, he retired after 17 years as Editor-in-Chief of the American Institute of Aeronautics and Astronautics (AIAA) *Journal of Guidance, Control, and Dynamics*. He managed the peer review of more than 6500 papers in a period of unprecedented growth for the journal and its consistent ranking as the number one journal in its specialty area. In 2001, he received the AIAA International Cooperation Award.

For many years he was a Lecturer in Aeronautics and Astronautics at MIT teaching estimation, control, navigation and advising thesis students, retiring in 2010.He is an author or contributing author of more than 100 technical papers, reports, encyclopedia articles, and books. He has been the Program Chair, Technical Chair, Track Chair, and Organizer of numerous IEEE, NATO, AIAA, and ION conferences and NATO Lecture Series. He has been the plenary speaker at several international conferences.

He received his SB and SM degrees in Aeronautics and Astronautics from MIT and his ScD in Instrumentation, also from MIT. He is a Life Fellow of the IEEE and an AIAA Fellow. His technical areas of interest are Guidance and Navigation Systems Design, Practical Kalman Filtering Applications, Applications of Satellite Navigation Systems

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