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To: IEEE Medal Award Committee  
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**Date**  
23 May 2023

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**Subject: support letter for the IEEE MILESTONE AWARD for “Long-Range Wideband Three-Dimensional Satellite Imaging Using the ALCOR Radar”**

Dear Members of the IEEE Medal Award Committee,

I am writing this letter in enthusiastic support of the nomination for the IEEE Medal Award for the groundbreaking achievement in Long-Range Wideband Three-Dimensional Satellite Imaging Using the ALCOR Radar, conducted at the Massachusetts Institute of Technology's Lincoln Laboratory. This work has made significant contributions to the fields of electrical and computer engineering and science for space situational awareness using imaging radars as early as 1970.

The development of the ALCOR radar antenna system represented a high-risk venture at the time, as it required generating and amplifying wideband pulses with 500 MHz of instantaneous bandwidth for 4 megawatt (MW) peak power at C-band (5.6 GHz) for achieving a remarkable 0.5m imaging resolution. Overcoming technical obstacles, including waveform compression through the use of surface acoustic wave (SAW) devices, the ALCOR radar system demonstrated the first real-time compression of wideband waveforms. Its operational success with the 20m diameter radome and 12m diameter antenna at the Kwajalein Atoll in 1970 marked the advent of a high-power, long-range, wideband fielded radar system for imaging space objects.

The significance of this achievement becomes evident when considering the numerous obstacles that needed to be overcome. In the late 1960s, widebandwidth radar technology was maturing, and there was a growing need for wideband observables in the Ballistic Missile Defense (BMD) community. The ALCOR radar system, besides serving as an instrumentation radar, became a test facility for wideband radar techniques under development at Lincoln Laboratory and other organizations within the BMD community. It played a crucial role in the proof-of-concept demonstrations for critical BMD functions, such as the assessment of re-entry vehicles and decoys.

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The achievements made with the ALCOR radar system went beyond incremental advancements and presented significant advances in the field. The ability to generate the first wideband radar images of remote space objects, such as the Soviet Salyut-1 space station imaged in 1971, marked a monumental breakthrough. This accomplishment, utilizing advanced ground-based wide-bandwidth radar, had never been achieved before. Subsequently, ALCOR's imaging capability led to the creation of the U.S. Air Force's Space-Object Identification (SOI) program, which provides vital information for the nation's space situational awareness defense posture.

The ability to observe and monitor space from Earth holds immense importance. Space serves as a domain of critical strategic importance, encompassing a wide array of applications ranging from communications and navigation to scientific research and national security. Through projects like the Long-Range Wideband Three-Dimensional Satellite Imaging Using the ALCOR Radar, we gain valuable insights into the objects and activities in space, enabling us to enhance space domain awareness. This awareness is essential for safeguarding critical space-based assets, ensuring the security and stability of space operations, and enabling efficient utilization of space resources.

The ground breaking work conducted by the ALCOR radar system at the Massachusetts Institute of Technology's Lincoln Laboratory also served as a catalyst for inspiring numerous organizations worldwide. The achievements made in the field of long-range wideband three-dimensional satellite imaging not only pushed the boundaries of technology but also sparked a wave of innovation in other institutions. One notable example is the German Research Establishment for Applied Science (FGAN) Research Institute for High-Frequency Physics and Radar Techniques (FHR), which developed the Tracking and Imaging Radar (TIRA) in the 1990s. The work of ALCOR not only revolutionized space object imaging but also disseminated knowledge and inspired further advancements in wideband radar technology across the globe, thereby expanding the frontiers of space research and exploration.

In conclusion, the work accomplished by the Massachusetts Institute of Technology's Lincoln Laboratory, in the field of Long-Range Wideband Three-Dimensional Satellite Imaging Using the ALCOR Radar, has made substantial contributions to the field. Their achievements, which were characterized by overcoming technical challenges, generating high resolution radar images, and providing vital information for space situational awareness, deserve the highest recognition through the IEEE Medal Award.

Thank you for considering this nomination. If any further information or supporting materials are required, please do not hesitate to contact me

Yours faithfully,

*Laura Auitou*

L. Anitori  
Senior Scientist and Programme Manager, TNO  
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