

Dr. Matt Markel



Summary of expertise

- Demonstrated ability to develop and lead diverse teams to deliver exceptional products
- Experienced Editor and co-author: **Radar for Fully Autonomous Driving (ISBN: 1630818968)**
- Deep technical experience in Radar, Electronic warfare, development and execution of technical roadmaps, and technology readiness assessments
- Widely known as an empathetic and inspirational leader, able to use soft influence to achieve large goals
- Dynamic public speaker on numerous topics including leadership, automotive radar, self-driving cars, and more

Ghost Autonomy (Jun 2021 – Feb 2023): Vice President, Radar Systems

Dr. Markel created and led the Radar Systems division of Ghost Autonomy, an autonomous driving company using breakthroughs in collision avoidance technology to develop safe, attention-free self-driving for mass market consumer cars.

Role

- Established the Radar Division.
 - Developed the product vision and roadmap strategy, mapped those to staffing and infrastructure needs.
 - Created a culture of accountability and organizational safety; hired engineers that brought not only technical excellence but also fit the culture to enable us to execute quickly.
 - Implemented optimal balance between SWAP-C constraints and advanced radar features / IP, including novel architecture for RF interference mitigation.
- Directed a team of 20, including 3 contractors.

Specific Accomplishments

- Integrated 1st Generation radar (external developmental radar with our custom proprietary waveform and processing) onto Ghost vehicles, enabling them to drive autonomously and safely at highway speeds.
- Delivered 2nd Generation radar, co-designed with overseas JDM in early February; 3rd Generation radar (entirely internally designed) through critical component evaluation, targeted design release late February.
- On-site test and evaluation infrastructure operational, enabling debug, characterization, and calibration of radars.

Waymo, formerly the Google Self Driving Car Project (Aug 2017 – Jun 2021): Head of Radar

Dr. Markel was responsible for all aspects of Radar development for Waymo from research and development through production.

Role

- Design, develop, test, and qualify radars for the Waymo self-driving passenger and truck fleets.

- Key focus was delivering a world-class imaging radar to the 5th generation platform, the Jaguar I-Pace, which now comprises the bulk of the Waymo fleet.
- Led a team of ~30 engineers.

Specific Accomplishments

- Delivered R6E, the most capable imaging radar in the automotive world, taking it from a non-functional prototype to production.
- Created the Waymo Radar Technology Development Model - securing funding, leading the creation of numerous demonstration programs to evaluate emerging technologies, quantify the phenomenology seen in the complex automotive environment, and burn-down risk. While the details are proprietary, the scope spanned from antenna coupons to full-system demonstrators.
- Restored a team with substantial execution and morale problems to one with strong engagement and exceptional execution velocity (>4 different products / generations currently in different stages of development / maturation).
- Grew the Radar team by 70% by bringing in nationally recognized talent from Tech and Defense / Aerospace to address bottlenecks in the Hardware, Software, and Architecture, Algorithms, & Analysis groups.

Raytheon Space and Airborne Systems (Nov 2010 – Aug 2017): Principal Engineering Fellow

In his tenure at Raytheon, Dr. Markel contributed to numerous dozens of programs and proposals, focusing predominantly on radar, electronic warfare (EW), and advanced technology efforts. In addition, he lead or participated in countless independent technical reviews, proposal reviews, and other strategic sessions, and served as Tech Advisor for Electronic Warfare at Raytheon internal education program (Raytheon's own graduate-level courses), bringing new methods of instruction, as well as broadening the curriculum for the department.

Role

- Technical Director for the Advanced EW directorate (the senior technical expert on all activities in the portfolio, working to maximize the technical contributions and warfighter capability through quality research, products, and offerings).
- Staff member for Raytheon's Chief Technologist: created and implemented roadmaps for technology development to ensure the right technologies were produced at the right time and at the right speed; assigned to numerous tiger teams / trouble spots when programs found themselves in trouble.

Specific Accomplishments

- Grew the business by > 300% through competitive pursuits, often shaping the customers' visions and research plans.
- Personally led key classified programs involving the development of critical technologies and high value customer relationships; these led to increased business, the transition of advanced radar and RF technologies to the warfighter, and development of high performing teams at Raytheon.
- Developed and led multiple internal workshops on key technologies and specific classified portfolios, and orchestrated several multi-business unit interchanges between Raytheon and the intelligence community.

Publications and Selected Patents

- Editor and author of *Radar for Fully Autonomous Driving* (ISBN: 1630818968, Artech House, 2022), the seminal and definitive work on the subject of radar for automotive autonomy

- Contributor to *Technology Readiness Assessment Guide: Best Practices for Evaluating the Readiness of Technology for Use in Acquisition Programs and Projects* (Published by US GAO)
- *Encapsulated electronic warfare architecture* (US10365348B2)
- *Radar interference reduction techniques for autonomous vehicles* (WO2022099243A1)
- *Slanted radomes* (US11226397B2)
- *Methods and systems for signal transmission using orthogonal doppler coding* (US11460569B2)
- *Low elevation sidelobe antenna with fan-shaped beam* (WO2022147387A1)

Education

Dr. Markel has a BSEE from the University of Missouri - Rolla (1990, now the Missouri University of Science and Technology), and a MSEE (1992) and Ph.D. (2002) from the University of Florida. He is a Raytheon Trained Architect.

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