Krzysztof Orzeł

Contact Information

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Summary Statement

① I am a tenacious engineer. I design radar systems. I built small ones, which fit in your hand, and bigger ones, which ended up on roofs, towers, and trucks. ② I am an open-minded scientist. I create the algorithms to digest the raw data and come up with the answers. ③ I am an advocate of a spatially distributed network of sensors cooperating to detect, track, and classify objects with intelligent node coordination. ④ I am always eager to learn new things and push forward.

Strengths

microwave engineering | weather radar | FMCW radar | MIMO radar | field campaigns | Linux | tracking | detection | classification | tornado chasing | Python | MATLAB | C,C++ | bash | git | docker | gpg | AWS EC2 | vpn | yubico

Languages

Polish ●●●●● **English** ●●●●◐ **German** ●●●◐○ **Japanese** ◐○○○○

Education

University of Massachusetts — Amherst, USA
PhD in Electrical & Computer Engineering — Graduation: 8/2014

Karlsruhe Institute of Technology (KIT) — Karlsruhe, Germany
Dipl.-Ing. in Electrical Engineering — Graduation: 6/2008

Gdansk University of Technology — Gdansk, Poland
M.Sc. in Electronics and Telecommunication Engineering — Graduation: 6/2008

Professional Experience

Arkenets Japan — Tokyo, Japan
CTO — 2/2020 –

- Developing software and algorithm solutions for 60 GHz MIMO radar network.

Soumei Consulting — Poland/Japan
Chief Scientist / Founder — 10/2017 – 9/2019

- Designed the data quality control pipeline for an FMCW monopulse radar.
- Implemented the detection and tracking algorithm for an FMCW radar.
- Providing guidance and technical leadership related to the UMass phase-spin weather-bird-drone radar operations. Published and presented research results.

aps Advanced Protection Systems (APS) — Gdynia, Poland
Lead Radar Systems Engineer — 2/2016 – 1/2018

- Key-member of a rapidly growing engineering team (joined company as an employee #4).
- Transformed a radar sensor prototype into a commercial product within 15 months.
- Directly involved in the design, testing, and promotion of a multi-sensor counter UAV detection and neutralization system.

UMASS AMHERST University of Massachusetts — Amherst, USA
Center for Collaborative Adaptive Sensing of Atmosphere (CASA)
Post Doctoral Research Associate — 10/2014 – 2/2016

- Conducted intensive customer discovery for a city-scale weather radar (NSF I-corps program).
- Established a new research collaboration with Olin College to study radar detection of unmanned aerial vehicles using a phase-spin weather radar.
- Performed phased-array antenna measurements in anechoic chamber to implement a novel antenna cross-polarization reduction technique.

Microwave Remote Sensing Laboratory (MIRSL)
Research Assistant — 09/2008 – 09/2014

- Designed and assembled an X-band, dual polarized, phase-tilt weather radar (PTWR).

- Deployed PTWR in Dallas-Forth Worth radar testbed.
- Developed multi-threaded, real-time data acquisition subsystem and weather radar processor.
- Designed a pulse compression filter, which improves radar sensitivity and range resolution.
- Developed a technique to optimize NLFM waveform design.

Graduate student senator 10/2012 – 9/2013
Field Engineer 4/2009 – 7/2010

- Member of the largest, multi-agency tornado research project in the history (Vortex 2).
- Provided hardware and software support for X-band and W-band polarimetric radars.
- Performed successful close range radar deployments on multiple tornadic supercells. The Research resulted in the identification of new weather signatures associated with the formation of tornadoes.

German Aerospace Center (DLR) Oberpfaffenhofen, Germany
Intern Engineer 10/2007 – 5/2008

- MSc thesis on: *"Further development of an integrated Ka-band receiver for an aperture synthesis radiometer"* within a project on a passive millimeter wave full body scanner for aviation safety and homeland security.
- Improved the quality of the microwave circuit boards fabrication process.

Airbus Defence and Space Ottobrunn, Germany
Test Engineer 6/2008 – 7/2008

- Supported anechoic chamber tests of a SATCOM-Bw2 satellite (passive intermodulation levels).

Intern Engineer 2/2007 – 7/2007

- Created software tools for design, simulation, optimization and analysis of a waveguide coupler.
- New design method has improved parameters up to 50%.
- Waveguide coupler designed with these tools is installed in a satellite ground base station.

BarcelonaTech (UPC) *Undergraduate Researcher* Barcelona, Spain
Implementation of the PLL frequency synthesizer for a bistatic SAR system. 10/2006 – 1/2007

Karlsruhe Institute of Technology *Undergraduate Researcher* Karlsruhe, Germany
Channel characterization of several urban scenarios using ray-tracing method. 8/2005 – 9/2006

Selected Awards
NSF I-Corps grant 4/2015
1^{st} place in Umass Innovation Challenge Minute Pitch Competition 4/2014
Spiros G. Geotis Prize, Best Paper Award at AMS 35^{th} Conference on Radar Meteorology 9/2011

Selected publications
V. Venkatesh, Orzel K., S.Frasier, Spaced-antenna aperture synthesis using an X-band phased-array, *Early Access on IEEE Geoscience and Remote Sensing Letters*, DOI: 10.1109/LGRS.2020.2995360., 2020

Orzel K. and S. J. Frasier, Weather Observation by an Electronically Scanned Dual-Polarization Phase-Tilt Radar, *IEEE Transactions on Geoscience and Remote Sensing*, vol. 56, no. 5, 2018.

Orzel K. and S. J. Frasier, Polarimetric observations by a phase-tilt weather radar in the DFW network, *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, 2017.

Orzel K, V. Venkatesh, T.Hartley, S.Frasier, Development and Calibration of a X-band Dual Polarization Phased Array Radar, *IEEE Radar Conference*, 2013.

Tanamachi R., H. Bluestein, M. Xue, W.C. Lee, K. Orzel, S. Frasier, R. Wakimoto, Near-surface vortex structure in a tornado and in a tornado-like vortex observed by a mobile, W-Band radar during VORTEX2, *Monthly Weather Review 141 (11), 2013*

All publications available at: k-orzel.github.io/publications

Journal Reviewer
IEEE Transactions on Geoscience and Remote Sensing 2014–
AMS Journal of Atmospheric and Oceanic Technology 2016–

Patent
Andrew Bennett and Krzysztof Orzeł: *Methods and systems for wet radome attenuation mitigation in phased-array antennae applications and networked use of such applications*. Patent No: US10389019B2, Date of patent: 8/20/2019.