Zhong Chen

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EDUCATION

Texas A&M University, College Station, Texas
Ph.D. in Electrical Engineering Dec 2020
M.S. in Electrical Engineering Aug 2015 – Aug 2017

Sichuan University, Chengdu, Sichuan, China
B.S. in Electrical Engineering (GPA: 3.89/4.0, Top 2) Sept 2009 – June 2013

RESEARCH EXPERIENCE AND PROFESSIONAL EXPERIENCE

Texas A&M University
Researcher (Nov 2015 – Present)

- Statistical Performance Analysis of Aperiodic Micro-UAV Swarm-Based (MUSB) Arrays
  - Derived asymptotic MSE of iterative-MUSIC (MUltiple SIgnals Classification) algorithm for the deterministic and stochastic error models in the presence of sensor gain, phase, and position errors
  - Derived and analyzed the Cramer-Rao bound (CRB) for jointed deterministic and stochastic model errors
  - Performed experiments with "Medusa" platform to verify the theoretical results
- Directional-of-arrival (DOA) Estimation with MUSB Arrays
  - Implemented robust Iterative-MUSIC algorithm for DOA estimation with MUSB arrays (3D random time-varying antenna arrays)
  - Build statistical model of MUSB arrays, investigated the DOA estimation performance in low noise low snapshot environment, derived the Cramer-Rao bound for the MUSB system, and estimate this system performance with Monte-Carlo simulations
  - Performed experiments with "Medusa" platform to verify the theoretical results
- Impact of UAV Swarm Density and Heterogeneity on Synthetic Aperture DOA convergence
  - Developed a DOA finding system using volumetric random arrays, estimate sources with MUSIC, DOA estimation error within 4 degrees
  - Performed experiments with the developed platform above and experiment results coincided with simulation results
- Tunable FM Band Tracking and Locating Cube Antenna System
  - Designed tunable monopole and loop electrically small antennas (FM band, antenna size: 100mm) to track and locate the FM signal

Student Technician for WAIC Project of AVSI (May 2020 – Aug 2020)

- Radio Altimeter (RA) Tolerance of Wireless Avionics Intra-Communications (WAIC) Systems Cooperated with NASA, FAA, and Aerospace Industry Members
  - Programmed for NI DAQ 6211with python to replace the Copilot to convert voltages from Honeywell RT-300 altimeter to height and create csv files
  - Tested different types of altimeters from Honeywell, Rockwell Collins, Thales, Garmin with RF interference
  - Programmed the testbed with python to control vector signal generator (VSG) to generate the 100 MHz QPSK-modulated 5G signals

Sichuan University, Chengdu, Sichuan, China
*Team Leader (*2010 – 2012*)*

- 10th National Undergraduate Electronic Design Contest (China's largest electronic design contest)
  - Design system hardware circuits
- Undergraduate Students' Innovative Plan
  - Hardware system programming

COURSE PROJECTS

Texas A&M University
Graduate Student (Sept 2015 – Present)

- Imaging Classification with Deep Neural Network
  - Built deep neural networks to train 500 labelled images and judge if a picture from test dataset is a cat
- Imaging Classification with Convolutional Neural Network (CNN)
  - Created CNN in TensorFlow to train 500 labelled "hand sign" images and recognize the sign of picture)
- Autonomous Driving Application – Car Detection
  - Object detection using the powerful YOLO algorithm with Keras
- Neural Machine Translation (NMT)
  - Built the NMT model with attention mechanism to translate human readable dates into machine readable dates

TEACHING EXPERIENCE

Texas A&M University, College Station, TX Sept 2017 – Present
Teaching Assistant

- Laboratory for Industrial Automation (IDIS/ ESET 400)
  - Teach the programmable logic controller (PLC) and its associated applications for IDIS/ ESET 400 students
  - Teach 4 lab sections and 2 hours each lab for around 80 students weekly
- Laboratory for Industrial Electricity (IDIS/ ESET 300)
  - Teach fundamental concepts of DC and AC electricity for IDIS/ ESET 300 students
- Laboratory for AC Circuits (ESET 211)
  - Teach AC circuits for ESET 211 students

WORK EXPERIENCE

TP-LINK, Shenzhen, China July 2013 – Apt 2015
RF Engineer

- AC2600 Wireless Dual Band Gigabit Router with multi-user MIMO (MU-MIMO) Technology
  - Designed dual-band (2.45 & 5.5 GHz) high gain high performance Wi-Fi (Size: 110mm* 7.4mm) to provide maximum omni-directional wireless coverage with beamforming technology
  - Tested the router system-level throughput in over-the-air (OTA) based on IEEE 802.11
- 450 Mbps Wireless Ceiling Access Point
  - Drafted PIFA antennas (2.45 GHz) to improve wireless coverage and lower the cost
- 300 Mbps Wireless Panel Access Point
  - Designed the DRAM circuits, RF circuits, IFA antenna, and antenna matching circuits

PUBLICATIONS

Journal Publications

1. Z. Chen, JF Chamberland, and GH Huff, "Performance analysis of iterative-MUSIC for time-varying arrays in the presence of sensor gain, phase and position errors," Manuscript.
2. Z. Chen, JF Chamberland, and GH Huff, "Iterative-MUSIC algorithm for time-varying arrays based on UAV swarm," Manuscript.
3. Z. Chen, S. Yeh, JF Chamberland, and GH Huff, "A sensor-driven analysis of distributed direction-finding systems based on UAV swarms," Sensors, 2019.
4. Z. Chen, "DOA convergence of unstructured distributed arrays with time-varying and space-varying morphologies," Master's thesis, Texas A&M University, College Station, TX, USA, 2017.

Conference Publications

1. Z. Chen, W. Liu, and GH Huff, ""Experimental campaign to evaluate the fundamental capabilities and limitations of synthetic DOA using swarming UAVs," Submitted to 2021 EUCAP.
2. Z. Chen, S. Yeh, JF Chamberland, and GH Huff, "Impact of position errors on synthetic aperture DOA convergence based on swarming UAVs," 2020 IEEE AP-S Symposium and USNC-URSI Radio Science Meeting, Canada, 2020. Selected as oral presentation
3. S. Yeh and Z. Chen, "Implementation of beamforming a circularly polarized radiation pattern on 3D random arrays," ISAP 2020

4. S. Yeh, Z. Chen, and Y. Wu, “Developing circular-polarized beamforming techniques on volumetric random arrays with arbitrary oriented array elements,” ISAP 2019
5. S.Yeh and Z. Chen, "Designing a broadband circularly polarized patch antenna array for millimeter-wave beamforming," APCAP 2019
6. Z. Chen, JF Chamberland, and GH Huff, "Impact of UAV swarm density and heterogeneity on synthetic aperture DOA convergence," 2017 IEEE AP-S Symposium and USNC-URSI Radio Science Meeting, San Diego, CA, USA, July 9-14, 2017. Selected as oral presentation

Patent

1. J. Tan and Z. Chen, "Dual-band WiFi omnidirectional antenna," application number: 201520257414.2, 2015.

LEADERSHIP

Electronic Science and Technology Association, Sichuan University Sept 2010 – June 2012
President

- In charge of large-scale contest organizations, technical support to the whole college, technical trainings to the juniors to help students learn and design all kinds of electronic technology
- Manage a team of 50 people

TECHNICAL SKILLS

- 3 years of experience in numerical simulations, data modeling and analysis using MATLAB and python
- Familiar with C, C++, TensorFlow, Keras
- Hands on experience with deep learning models
- Familiar with Linux operating system
- Experience in front-end development (Maintain a personal website)
- Professional antenna and phased array design experience with HFSS
- RF system hardware design experience

TECHNICAL PROJECTS

- doa-library: A doa library for statistical performance analysis of MUSB arrays (time-varying 3D random arrays)
  - Programmed the different arrays (ULA, UCA, MUSB arrays, etc.)
  - Implemented MUSIC (2D MUSIC, Iterative-MUSIC) algorithms for MUSB arrays
  - Implemented functions for CRB to analyze DOA estimation performance
  - Implemented functions for asymptotic MSE of iterative-MUSIC for MUSB arrays
- Medusa array system
  - Practical 3D random time-varying antenna arrays for DOA estimation applications

HONORS AND AWARDS

Texas A&M University

- **Scholarship and In-state Tuition Fee Award**, awarded to the top 5% students Sept 2015 – May 2016

Sichuan University

- **Outstanding Graduates**, awarded to the top 2% students March 2013
- **National Encouragement Scholarship**, awarded to the top 3% students Sept 2011 – Oct 2012
- **Excellent Student Leader**, awarded to the top 2% students Sept 2010 – Oct 2011
- **Excellent Volunteer**, awarded to the top 5% volunteers Sept 2010 – Oct 2011
- **Comprehensive First-Class Scholarship**, awarded to the top 5% students Sept 2009 – Dec 2010
- **National Scholarship** (highest scholarship in China), awarded to the top 2 students Sept 2009 – Nov 2010