

Hangyu Chen

Tel: +86-18810873151, Email: zy1702202@buaa.edu.cn

ACADEMIC BACKGROUND

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| Beijing University of Aeronaut and Astronaut Yunnan Innovation Institute | Jun. 2020 - Present |
| • Research Assistant | |
| Beijing University of Aeronaut and Astronaut | Sept. 2017 - Jun. 2020 |
| • M.S in Electronic and Communication Engineering, overall GPA: 3.16/4.0 | |

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| North University of China | Sept. 2013 - Jun. 2017 |
| • B.Sc. in Photoelectric Information Science and Engineering, overall GPA: 3.14/4.0 | |

Relevant Courses: Microwave Electronic Circuit, Microwave Engineering, Antenna, Signal and System, Digital Circuit, Analog Circuit, Digital Signal Processing.

SKILLS

- **Software:** MATLAB, CST Studio, ANSYS HFSS, FEKO, Keil, Vivado, IAR, TeXstudio, Origin, Altium Designer, Solidworks, Auto CAD, Unigraphics NX.
- **English Proficiency:** TOEFL (R:19 + L:23 + S:21+ W:27 = 90)(Updating), TOEFL Best Score (R:25 + L:23 + S:21+ W:27 = 96), CET-4, CET-6.

SUBMISSIONS & PUBLICATIONS

- **H. Chen**, Hong. T, ‘An Active Scattering Camouflage Metasurface Inspired by ‘Chessboard’ Method’. IEEE Transactions on Antenna and Propagation (Submitted and under review) (**IF: 5.7**).
- **H. Chen**, Zhao. J, Hong. T, Zheng. S, Hong. H, Cheriet. M. ‘A Measurement Method of Fifth-generation Multiple-input Multiple-output Antenna Based on Microwave Imaging’. International Journal of Distributed Sensor Networks (**IF: 2.3**).
- J. Zhao, **H. Chen** and X. Ye, ‘Research on the RCS of Serrate Gap in Real Aircraft State’. 2018 IEEE 18th International Conference on Communication Technology (Awarded the Best Oral Presentation of Sessions).

RESEARCH EXPERIENCE

Design of ASCMS (Active Scattering Camouflage Metasurfaces) Inspired by ‘Chessboard’ Method.

To make the equipment on the ground suit background around and hidden from some radar detections overhead, the scattering characteristic of ASCMS, composed of uniform units loaded with PIN diodes, is investigated in this research. My main contributions are listed below:

- Analyze and build up the algorithm to synthesize and manipulate the scattering of ASCMS, and then verify algorithm in Matlab.
- Design and simulate ASCMS units loaded with PIN diodes in CST Studio to satisfy both amplitude and phase requirement in algorithm.
- Implement units in CST Studio with specific distribution of units corresponding to the set scattering goal via co-simulation method. Then, transform the simulation model in CST Studio into Printed Circuit Board file in Altium Designer and fabricate ASCMS.
- Integrate the algorithm and ASCMS control into both programmable logic (PL) and processing system (PS) of hardware platform Xilinx Zynq-XC7Z010, where data interact via AXI4-Lite interface.

Design of Wideband Cascaded Slot Feed Phased Array with Low Sidelobe

A linear array comprised of 16 antenna elements are devised to achieve wide operation band and low sidelobe level. For single element, patches are cascaded vertically. Furthermore, EM energy, output by T/R modules and travelling along microstrip line, is coupled into slots. My contributions are listed below:

- Design and optimize the double layer patch antenna element according to performance indexes such as operation bandwidth in ANSYS HFSS.
- Calculate the specific excitation power weight to achieve set sidelobe level goal and array elements linearly in HFSS to verify sidelobe level.
- Design one to sixteen power divider in HFSS and simulate both power divider and linear array. Insert attenuator, digital phase shifter and LNA and conduct measurement.

Design of Non-uniform Dual-frequency Phased Array with Wide Scanning Angle

To achieve a phased array operating at two distinct frequencies and realize wide-angle scanning of high frequency array, both quasi hexagonal patch array and dipole array are deployed. My contributions are listed below:

- Design and optimize patch antenna and erected dipole antenna in HFSS, including the balun transformer to rectify the beam.
- Deploy and synthesize the whole array in a proper way to extend the scanning angle and depress grating lobe compared with conventional rectangular lattice array and verify deployment in Matlab.
- Array antenna elements and assign port excitations in HFSS with the stimuli derived from numerical calculation and conduct simulation.

Antenna Scattering Analysis and Extraction Based on Radar 1D and 2D Imaging

To modify conventional method of extracting the scattering of antenna and detect the working status of MIMO array, a detection and extraction method based on both 1-D and 2-D microwave imaging is investigated in this research. My contributions are listed below:

- Learn radar one-dimensional and two-dimensional imaging algorithm and implement algorithm in Matlab.
- Analyze the scattering constituents of antenna and conduct the simulation in FEKO, where electric fields are extracted to verify the analysis in 1-D and 2-D imaging algorithm.
- Separate structural scattering from mode scattering of the antenna and extract complete scattering of antenna via electric field data stemmed from FEKO in Matlab.

EXTRACURRICULAR PROJECT EXPERIENCE

Intelligent Bicycle System with Automatic Shift and Anti-theft

This project we applied for was selected as ‘National College Students Innovation and Entrepreneurship Project’ (**Rank: 3rd out of total 245**) when I was sophomore in 2015. Finally, project was accomplished on time and received recognition and 10000 yuan as the financial support from China Ministry of Education. As the team leader, my contributions are listed below:

- Learn and debug the communication between the STM32 MCU and acceleration sensor, gyroscope sensor MPU6050, GSM+GPS system SIM808, and orthogonal encoder.

- Merge data from sensors and update AHRS information of bicycle as the trigger of alarm.

- Extract location information and send an alarming message to the owner of bicycle via the communication with SIM808 in ‘AT’ commands.

- Capture the trigger from both Hall sensors and orthogonal encoder, and then calculate the speed accurately to provide speed information and alter to low or high gear.

Design of Quadcopter

- Design the flight control board PCB by Altium Designer and assemble mechanical and electronic parts.

- Study the theory of quadcopter and debug communication between master STM32F103RBT6 MCU and acceleration sensor, gyroscope sensor MPU6050, geomagnetic sensor HMC5883L and 2.4 GHz wireless module nRF2401.

- Build up PID algorithm to control the quadcopter in AHRS information calculated via electric sensors.

Grocery Cashier System

To support the small grocery of my parents and reduce cost for my family, a mini cashier desk application driven by lightweight database MySQL was devised and is still in use at present.

- Learn E language grammar and basic SQL commands.

- Construct the basic application frame on screen and logic of the whole system including processing the input information, adding or deleting the commodity information and etc.

- Debug the interaction between application and database via SQL commands in E language.

SELECTED HONORS & AWARDS

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| ◆ National College Students Innovation and Entrepreneurship Project | Team leader |
| ◆ ‘Reneshes’ Cup National Undergraduate Electronic Design Contest in Shanxi | Second Prize |
| ◆ ‘TI’ Cup Shanxi University Student Electronic Design Contest | Second Prize |
| ◆ Beijing University of Aeronaut and Astronaut Graduate Academic Scholarship | |