

# GAN Yu

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## Education

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### University of Michigan

Ann Arbor, USA

M.S. in Electrical & Computer Engineering

August 2021 - April 2023

- Track: Network, Communication, and Information Systems (NCIS)

Coursework:

- EECS598-005 Quantum Info, Prob and Comp (A)
- EECS501 Probability and Random Processes (A)
- EECS555 Digital Communication Theory (A)
- EECS554 Introduction to Digital Communication and Coding (A-)
- EECS551 Matrix Methods for Signal Processing, Data Analysis and Machine Learning (B+)

### University of Electronic Science and Technology of China (UESTC)

Chengdu, China

### University of Glasgow (UK)

Dual Degree: BEng in Communication Engineering

September 2017 - June 2021

## Work Experience

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### University of Michigan

Ann Arbor, USA

Graduate Student Research Assistant: Prof. S. Sandeep Pradhan

August - December 2022

Designing Five Qubit Quantum Error Correction Circuit of Fault-tolerant Gates for Quantum Computing on Qiskit:

- Fault-tolerant *Pauli* and *H* gate were designed transversally but the latter one was appended with some permutations.
- Implemented the Five Qubit Fault-tolerant *CNOT*, *CZ* and *CY* gate using a piecewise fault-tolerance circuits, incorporating permutation operators based on the architectural guidelines by Theodore J. Yoder and Isaac L. Chuang.
- Five Qubit Fault-tolerant *T* gate is divided into four parts: Magic state preparation, Fault-tolerant Zero state preparation appended with Clifford groups, Fault-tolerant *CY* gate implementation and Measurement with post-processing.
- Successfully simulated all designed gates in both ideal and depolarizing noise environments. And infidelity will be evaluated by simulating the fault-tolerant circuit designs on IBM Falcon Quantum Processors and we are still working on it.

## Research Experience

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### Balloon System Communication Links Simulation Project

Ann Arbor, USA

Team Research, Advisor: Prof. Wayne E. Stark

March - April 2022

- Simulated the communication links of preambled-DQPSK using GNU Radio.
- Comprised the transmitter and receiver by different block modules for achieving DQPSK modulation and demodulation respectively.
- Evaluated the performance of the whole system according to the BER of single and multiple packets under different phase offsets and doppler shifts.

### Wireless and Optical Transmission Systems Project

Chengdu, China

Independent Research, Advisor: Prof. Imran Shafique

November - December 2020

- Established a stable high-quality link between the satellite and the ground by SIMULINK.
- Designed the structure of the link: Data generator, transmitter block, downlink path, receiver block, BER calculator and Power spectrum scope.
- Designed the downlink path blocks based on the RF satellite link example on MathWorks.

- Applied CDMA, TDMA and FDMA to the transmitter & receiver block, and did the simulation.
- Compared the BER (Bit error rate) and constellation diagram of the three methods

### **Intelligent Resource allocation for Unmanned Aerial Vehicle Networks**

Chengdu, China

*Independent Research, Advisor: Prof. Gang WU*

*June 2020 – June 2021*

- Built a system model on MATLAB, which included D2D users, Cellular users and represented the SINR of each on the resource blocks at unmanned aerial vehicles (UAVs). Based on the service quality of V2I, V2V link, transformed the resource allocation problem to an optimization problem.
- Used hypergraph matching to solve the resource sharing problem, *three-partite graph matching* algorithm was utilized based on *Local Ratio* Algorithm.
- Considered on the mobility of UAVs, adopted *Q-learning* algorithm (the UAV was regarded as an agent which could take four actions and followed a greedy policy, with  $\epsilon$  was set to 0.9) to improve the resource allocation strategy.

### **Skills**

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Coding Skills: MATLAB, Python (Pytorch), Julia, C++, LaTeX

Software Skills: Visual Studio, Simulink, Cadence, Vivado, LTspice, GNU Radio, Aircsim