

# Zhongze Tang

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## SUMMARY

I am a Ph.D. student who is working on eliminating privacy concerns, in particular those in multimedia systems. I come from the ECE Department of Rutgers University, and my advisor is [Dr. Sheng Wei](#). My current work focuses on privacy-preserving multimedia systems implementation using AI (i.e., privacy-preserving mechanisms design) and cloud deployment (i.e., privacy-preserving serverless cloud architecture).

## PUBLICATIONS

Mengmei Ye, **Zhongze Tang**, Huy Phan, Yi Xie, Bo Yuan, Sheng Wei, “Visual Privacy Protection in Mobile Image Recognition Using Protective Perturbation”, ACM Multimedia Systems Conference (**MMSys**), 2022.

Zichen Zhu, Xianglong Feng, **Zhongze Tang**, Nan Jiang, Tian Guo, Lisong Xu, Sheng Wei, “Power-Efficient Live Virtual Reality Streaming Using Edge Offloading”, Workshop on Network and Operating System Support for Digital Audio and Video (**NOSSDAV**), 2022.

Xianglong Feng, Yi Xie, Mengmei Ye, **Zhongze Tang**, Bo Yuan, Sheng Wei, “Fake Gradient: A Security and Privacy Protection Framework for DNN-based Image Classification”, ACM Multimedia Conference (**MM**), 2021.  
(Acceptance rate: 542/1942 = 27.9%)

**Zhongze Tang**, Xianglong Feng, Yi Xie, Huy Phan, Tian Guo, Bo Yuan, Sheng Wei, “VVSec: Securing Volumetric Video Streaming via Benign Use of Adversarial Perturbation”, ACM Multimedia Conference (**MM**), 2020.  
(Acceptance rate: 472/1698 = 27.8%)

## RESEARCH PROJECTS

### **A Privacy-preserving Serverless Cloud Architecture**

*Ph.D. Research Project (On-going)*

**Advisor:** Dr. Sheng Wei

- Exploring a novel serverless architecture where the data owner utilizes different privacy enhancement frameworks flexibly to change data privacy level and thus comply with the data regulations.

### **Protective Perturbation – a Privacy Enhancement Framework**

*Ph.D. Research Project*

**Advisor:** Dr. Sheng Wei

- Designed and trained a Protective Perturbation Generator, which creates protective perturbations in real-time that blur an image completely. The protected image can no longer be recognized by human vision anymore but can still be classified by neural networks as before, without accuracy loss.
- Working on extending the models to be protected from image classification models to other models like optical flow estimation (e.g., FlowNet2) and 3D Point Cloud classification (e.g., PointNet++).

### **A Security-preserving Volumetric Video Live Streaming System**

*Ph.D. Research Project*

**Advisor:** Dr. Sheng Wei

- Developed a DASH-based end-to-end volumetric video live streaming system.
- Demonstrated how face ID spoofing attacks were triggered by using the 3D facial data.
- Designed and trained a generative model to add perturbations to the volumetric video, to defense against face ID spoofing attempts.

### **Towards a 3D Video Live Streaming System**

Spring 2019

*Special Problem Project (Graduate Level)*

**Advisor:** Dr. Sheng Wei

- Investigated the features and implementations of various 3D media, including 3D meshes, Point Clouds (PC), and RGB-D based 3D contents.
- Created a PC player with C++ and the Point Cloud Library (PCL), which can play PC-based 3D videos.

### **Towards a Healthy Eating Habits Using Wi-Fi**

Sep 2018 – May 2019

*Master's Thesis Project*

**Advisor:** [Dr. Yingying Chen](#)

- Collected and extracted Channel State Information (CSI) from Wi-Fi signals, using a router with modified firmware, a laptop with a custom kernel, and an Android smartphone.
- Used MATLAB and Support Vector Machine (SVM) to recognize and analyze the user's eating behaviors.

## **COURSE PROJECTS**

### **Systolic Array for DNN Inference (Teamwork)**

Fall 2020

*CAD DIG VLSI Design*

- Implemented 4x4 signed INT8 matrix multiplication using systolic array architecture in Verilog. FSM-controlled UART communication and an I/O FIFO were also implemented for data transmission.
- Deployed it to an Arty S7-50 FPGA board using Vivado.

### **FPGA-Based Simulation of Quantum Key Distribution (Teamwork)**

Fall 2020

*Intro to Quantum Information Science*

- Simulated BB84 Quantum Key Distribution protocol by using 2-bit integer to represent quantum states. The behavior of an eavesdropper who measured the Qubit states maliciously was also simulated.
- Applied matrix multiplication (using systolic array) to simulate Qubit state update (i.e., multiplying the gate matrix and the Qubit gate vector will get a new state).
- Deployed the entire system on two Arty S7-50 FPGAs, by using UART to communicate with each other.

### **This Pokémon Does Not Exist (Teamwork)**

Fall 2020

*Machine Vision*

- Designed and trained a Generative Adversarial Network (GAN) based on DCGAN which generates Pokémon that does not exist.

## **EDUCATION**

**Rutgers, the State University of New Jersey**

**GPA 4.00**

**School of Engineering, Piscataway, NJ**

Sep 2017 – May 2024 (exp.)

*Doctor of Philosophy, Electrical and Computer Engineering*

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

**GPA 3.74**

**School of Automation Engineering, Chengdu, China**

Aug 2014 – Jul 2018

*Bachelor of Engineering, Measurement & Control Technology and Instrumentation*

## **TEACHING & SERVICES**

*Teaching Assistant of Rutgers ECE 231 & 233 Digital Logic Design & Laboratory*

Fall 2020, 2021, 2022

*Co-Mentor of Undergraduate Special Problem*

Spring 2022

*Volunteer in HOST 2022, D.C., U.S.A.*

Jun 2022

*Volunteer in ICDCS 2021, Virtual*

Jul 2021

*Teaching Assistant of Rutgers ECE 437 Digital Systems Design*

Fall 2019