

Ghufran Baig

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EDUCATION **The University of Texas at Austin**, Austin, USA, Sep 2014 - Present
Department of Computer Science
◇ **Phd**, Computer Science
◇ Advisor: Lili Qiu, Department of Computer Science
Lahore University of Management Sciences, Pakistan, Sep 2009 - Jun 2013
School of Science & Engineering
◇ **B.S.**, Electrical Engineering, June 2013.
◇ Advisor: Zartash Uzmi, School of Science & Engineering

PUBLICATIONS **Conference**

- ◇ Y. Li, Q. Li, Z. Zhang, **Ghufran Baig**, Lili Qiu, S. Lu “Beyond-5G Reliable Extreme Mobility Management”. Accepted to **ACM SIGCOMM, 2020**.
- ◇ **Ghufran Baig**, Jian He, M. A. Qureshi, Lili Qiu, G. Chen, P. Chen and Y. Hu. “Jigsaw: Robust Live 4K Video Streaming”. Accepted to **ACM MOBICOM, 2019**.
- ◇ S. Pradhan, W. Sun, **Ghufran Baig**, Lili Qiu. “Combating Replay Attacks Against Voice Assistants”. Accepted to **ACM UBICOMP 2019**.
- ◇ **Ghufran Baig**, I. Kash, T. Karagiannis, B. Radunovic, Lili Qiu. “Interference management for unlicensed users in shared CBRS spectrum”. Accepted to **ACM CoNEXT, 2018**.
- ◇ S. Pradhan, **Ghufran Baig**, W. Mao, Lili Qiu, G. Chen, Bo Yang. “Smartphone-based Acoustic Indoor Space Mapping”. Accepted to **ACM UBICOMP 2018**.
- ◇ **Ghufran Baig**, D. Alistarh, T. Karagiannis, B. Radunovic, M. Balkwill, Lili Qiu. “Towards unlicensed cellular networks in TV white spaces”. Accepted to **ACM CoNEXT, 2017**.
- ◇ A. Munir, **Ghufran Baig**, S. M. Irteza, I. Qazi, Alex Liu, F. Dogar. “Friends, not Foes Synthesizing Existing Transport Strategies for Data Center Networks”. Accepted to **ACM SIGCOMM, 2014**.
- ◇ M.S. Ilyas, **Ghufran Baig**, M.A. Qureshi, Q.U.A. Nadeem, A. Raza, M.A. Qazi, B. Rassool “Low-Carb: Reducing Energy Consumption in Operational Cellular Networks”. Accepted to **IEEE GLOBECOM '13**.
- ◇ F. Aslam, **Ghufran Baig**, M.A. Qureshi, Z. A. Uzmi, L. Fennell, P. Thiemann, C. Schindelhauer, E Hausmann “Rethinking Java call stack design for tiny embedded devices”. Accepted to **IEEE LCTES '12**.

Journal

- ◇ A. Munir, **Ghufran Baig**, S. M. Irteza, I. Qazi, Alex Liu, F. Dogar. “PASE: Synthesizing Existing Strategies for Near-Optimal Datacenter Transport”. Accepted to **IEEE/ACM Transactions on Networking**.

PATENTS ◇ **Distributed Selection of White Space Channels** (US 20170223549 A1)
Bozidar Radunovic, Thomas Karagiannis, Dan A. Alistarh, Ghufran Baig

RESEARCH PROJECTS

- ◇ **CellFi - Extending LTE to TV Whitespace Spectrum**
 - Developed LTE-compatible decentralized interference management for unlicensed operation in TV whitespcae spectrum.
 - Prototyped on **IP Access E40** LTE small cell and **NS3** simulator.
- ◇ **F-CBRS - Fascilitating GAA users in CBRS spectrum**
 - Developed a fair spectrum allocation policy for unlicensed users with conflicting incentives in CBRS spectrum.
 - Prototyped on **Juni JLT625** and **Baicell mBS1100** LTE small cells and python based simulator.
- ◇ **Real-time Video Anlyatics on Mobile Devices**
 - Developed a real-time video analytics system for mobile devices using motion estimation between video frames.
 - Used **OpenCV** for extracting reliable motion estimation.
 - Implemented the system over **Nvidia Jetson TX2** using YOLO DNN model and **cuDNN**.
- ◇ **Live 4K Video Streaming over Mobile Devices**
 - Developed a fast & light-weight layered video codec for streaming live 4K videos over **60 GHz** wireless link to resource-constrained mobile devices.
 - Implemented on mobile GPUs via optimized **CUDA** and **OpenCL** kernels.
 - Modified **wil6210 (802.11ad)**, **ath10k (802.11ac)** and interface bonding drivers in Linux for real time scheduling and bitrate adaptation.
- ◇ **Synthesizing Existing Transport Strategies for Data Center Networks**
 - Developed deployment friendly, yet highly efficient datacenter transport protocol.
 - Implemented and evaluated on **NS2**.
- ◇ **Adaptive Scheduling for Edge-Assisted DNN processing**
 - Developed adaptive batching strategy to execute deep neural networks more efficiently on edge servers equipped with GPUs.
 - Modified **PyTorch** source code to implement the adaptive batching algorithm.
 - Implemented collaborative execution of DNN on client GPU using **Nvidia Jetson Nano** board.
 - Tested for various DNN models (**VGG**, **ResNet**, **GoogleNet** etc.) on Nvidia P100.
- ◇ **Smartphone-based Acoustic Indoor Space Mapping**
 - Developed an acoustic-based system for indoor map construction.
 - Used smartphone **IMU sensors** with audio FMCW chirps to map walls.

WORKING EXPERIENCES

- ◇ **Teaching Assistant**
University of Texas at Austin, TX, August 2014 - Current
 - Computer Networks, Introduction to Wireless Networking, Natural Language Processing, Grounded Natural Language Processing, Database Systems, Elements of Computer Programming.
- ◇ **Research Intern**
Microsoft Research, Cambridge, UK, June 2017 - August 2017
 - Developed techniques to enable unlicensed LTE operation in CBRS spectrum.

- ◇ **Research Intern**
Microsoft Research, Cambridge, UK, June 2015 - August 2015
 - Developed techniques to enable unlicensed LTE operation in TVWS spectrum.
- ◇ **Research Intern**
Hewlett Packard Labs, CA, May 2016 - August 2016
 - Experimental study on co-Existence of LTE-U and Wi-Fi Networks.
- ◇ **Summer Research Scientist**
Crimson Vista, TX, May 2019 - August 2019
 - Developed ransomware mitigation system based on RAM journaling

SKILLS

- ◇ **Programming Languages:** C/C++, Python, Java, CUDA, OpenCL, MATLAB, Bash, AWK, MySQL.
- ◇ **Software:** OpenCV, NS2, NS3, MiniNet, QEMU Emulator & Virtualizer, PANDA System Emulator, GNU Radio, OpenEPC.
- ◇ **Neural Network Frameworks:** TensorFlow, PyTorch, Keras, Caffe, Darknet.
- ◇ **Linux Kernel Programming:** Wireless drivers (ATH10k, WIL6210, IWL5300), Linux Ethernet Bonding driver.
- ◇ **Hardware:** *Embedded Platforms* (NVIDIA Jetson TX2, NVIDIA Jetson Nano, Raspberry Pi, HummingBoard Pro, BeagleBone), *LTE small Cells* (Qualcom MTP99xx, Juni JLT625, BaiCells mBS1100), *Software Defined Radios* (Ettus USRP N200/N210, NI 2953), *FPGA Boards* (NetFPGA)

REFERENCES

- **Lili Qiu,**
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- **Bozidar Radunovic,**
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- **Thomas Karagiannis,**
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thomas.karagiannis@microsoft.com
- **Zartash Afzal Uzmi,**
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- **Fahad Dogar,**
Assistant Professor, Department of Computer Science, Tufts University, US
fahad@cs.tufts.edu
- **Ihsan Ayyub Qazi,**
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