JOSHUA J. BAKITA

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EDUCATION

Doctor of Philosophy in Computer Science, *University of North Carolina at Chapel Hill* Aug. 2019 - Dec. 2022
Master of Science in Computer Science, *University of North Carolina at Chapel Hill* Aug. 2018 - May 2019
- Courses of Note: Real-Time Sys, Computer Vision, OS Impls, Data Ctr. Sys & Programming, Data Ctr. Software Dynamics,

Bachelor of Science in Computer Science, *University of North Carolina at Chapel Hill* Aug. 2014 - May 2018
- **Graduated with Honors** | 3.57 Computer Science Course GPA | Fall 2016 Honors Study Abroad in London
- Courses of Note: Digital Logic & Computer Design, OS, Computer Security, 2D Graphics, Data Compression

TECHNICAL EXPERIENCE

Dept. Computer Science - UNC Chapel Hill*, Research Assistant with Dr. James Anderson* Aug. 2017 - Current
- Research goal: Enable real-time heterogeneous systems to operate safely and efficiently for autonomous vehicles
- **Linux kernel contributor**, LITMUS-RT maintainer, and general systems dev (pubs: 2nd auth. at ECRTS'19, 3rd in J. of RTS)
- Tech lead for the MC² project, a patch enabling Linux to predictably schedule and isolate mixed-criticality real-time tasks on multicore systems. Work published as **1st author at RTAS'21**. Some components of my work include:
  - → Analyzing how isolation in caches, DRAMs, and memory buses on multicore ARM and x86 affects exec. time variability
  - → Developing novel ways to isolate, e.g. NUMA-based **O(1) page coloring** in Linux's allocator (O(n) prior state-of-the-art)
  - → Rewrote MC² to allow for predictable execution times when using SMT, boosting schedulable utilization by 22%
- Exploring safe **GPU sharing for real-time systems** (pubs: **1st auth. at OSPERT'18**, 3rd at RTAS'19, and 4th at ECRTS'18)

General Motors Research, *Research & Development Intern*, Remote June 2020 - Aug. 2020
- Developed and evaluated lossless GPU parallelization techniques in **CUDA** and **C++** for autonomous vehicle perception DNNs
- New approach enables **one device to do the work of two** at comparable latency by reducing ctx. switches in the GPU MMU

Dept. Computer Science - UNC Chapel Hill, *Teaching Assistant for Programing Lang. Concepts* Jan. 2019 - May 2019
- Taught **Haskell**, **Rust**, **Julia**, and **Go** to illustrate fundamental programming language concepts
- Honored with "**Teaching Assistant of the Year**" award by CS undergraduates and faculty. Nominated by >30% of my class

Microsoft Corporation, *Software Engineering Intern*, Redmond, WA May 2018 - Aug. 2018
- Worked in **C++** on the Web Platform Team to help build the Edge browser (**>100 million active users**) + Windows app APIs
- Implemented CSS parser, DOM interface, and **GPU-accelerated rendering** for background-blend-mode and mix-blend-mode (used by .04% and .111% of all web pages per Bing, both are top 55% most used CSS properties)
- Wrote web platform interoperability tests in **HTML**, **CSS**, and **JavaScript** to benchmark and beat Chrome's implementation

Microsoft Corporation, *Software Engineering Intern*, Issaquah, WA May 2017 - Aug. 2017
- Redesigned architecture for lead unsubscribe, **increasing speed 2x** for customer and protecting from **over $3B** in fines
- Worked in **C#** and **SQL** on enrichment and privacy management systems processing over **16 million leads** weekly

Capital One Financial Corporation, *Software Engineering Intern (TDP)*, McLean, VA June 2016 - Aug. 2016
- Refactored free CreditWise tool (**>11 million active users**) to **speed up deployment 10x**, startup by 2x, and testing by ~2x
- Full stack development in **Java**, Spring MVC, **CSS**, **HTML**, and **AngularJS** on Apache Tomcat in **AWS** EC2
- Optimized test workflow, removed all proprietary libraries, and significantly slimmed backend codebase size

Dept. Computer Science - UNC Chapel Hill, *Research Assistant with Dr. Henry Fuchs* June 2015 - Dec. 2015
- Led a team to apply wearable accelerometers for motion tracking. Personal contribs. in **C** on Arduino and **Java** on Android

Wildfire Games, *Open-Source Game Developer* June 2013 - Aug. 2014
- Led a team to develop an online multiplayer matchmaking lobby and ranking system based on XMPP for 0 A.D. RTS
- Worked with **C++**, **JavaScript**, and XML client-side, **Python** and **Erlang** server-side

SELECTED PROJECTS AND EXTRACURRICULARS

MIPS I Processor: Full, consumable implementation of the MIPS I instruction set using Verilog on the Nexys 4 FPGA
SafeShare: A vehicle-sharing platform built on mathematically verifiable trust via the Ethereum blockchain
- **Won Best Use of the Blockchain**, **Best Hack Addressing Inequality** and two other awards at HackDuke 2017

SGI Keyboard Driver: A Linux kernel module implementing support for SGI's serial keyboards (partially reverse engineered)
UNC Energy Dashboard: A way to monitor and react to energy usage on-campus | **Won Microsoft Challenge** at HackNC '15
Share Sphero: Cross-platform, multi-user, shared real-time control of the Sphero robot using Web Sockets and HTML5

UNC Renewable Energy Special Projects Committee (RESPC), *Voting Member* Sep. 2014 - May 2019
- Collaborated with a committee of over 15 students to **manage over $1M** for renewable energy initiatives on campus

UNC Computer Science Club, *President* May 2017 - Aug. 2018
Rancho 3M Christian School and Orphanage, *Missions Trip Volunteer*, Guadalupe, Mexico 2010,11,13,15,16,19
Eagle Scout; Boy Scouts of America, *Troop 94* 2007 - 2014