

# YUKANG XIE

✉ [bathtub@whu.edu.cn](mailto:bathtub@whu.edu.cn) <https://github.com/bathtub-01>

## Education

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### Wuhan University, Wuhan

*Master of Engineering in Cyberspace Security*

*Sept, 2021-June, 2024 (expected)*

*Average Score: 87.52/100*

### Huazhong University of Science and Technology, Wuhan

*Bachelor of Engineering in Hydraulic and Hydro-Power Engineering*

*Sept, 2017-June, 2021*

*Average Score: 80.4/100*

## Research Experience

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### Reconfigurable Dataflow Architecture for Cryptography Processing

*2023-Present*

*A crypto processing framework aiming both efficiency and flexibility, current work for master's thesis*

- Integrating heterogeneous coarse-grained crypto operation units with on-chip networks.
- Designing a programming model and DSL for describing crypto protocol/algorithm in a dataflow manner.
- Mapping the programming model into a dataflow architecture to achieve reconfigurability.
- Tuning the performance of on-chip network with simulator and verifying the design through FPGA prototyping.

### Virtualization Support of Symmetric Cipher Hardware Accelerators

*2022-2023*

*Optimized architectures for AES and SM4, main designer and implementer*

- Aiming to improve hardware utilization efficiency and enhance user experience in virtualized environments.
- Proposed schemes partition cipher modules' pipeline into independent units to enable parallel execution of tasks from different guests.
- Achieved comparable throughput/area efficiency to previous work while supporting guest-level parallelization.
- This work has been accepted by ICA3PP 2023 as regular paper.
- The paper is under publishing. Preprint available at: <https://easychair.org/publications/preprint/BNHg>.

## Personal Projects

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### WASM-PROCESSOR

*2023-Present*

*A 3-stage pipelined WebAssembly processor, work in progress*

- The design is implemented in Chisel HDL.
- Supports basic 32-bit instructions defined in WebAssembly spec, including arithmetic & logic operations, branches and function calls.
- Goal: Drawing practical conclusions on whether WebAssembly can be used as a reference for designing secure ISAs for microprocessors.
- The project has been open-sourced on GitHub: <https://github.com/bathtub-01/wasm-processor>.

### Bathtub Thoughts (<https://bathtub-01.github.io>)

*2022-Present*

*Personal tech blog*

- Sharing knowledge from work experience and self-learning journey.
- Topics include PL theory, computer architecture and hardware development.

## Skills & Interests

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- **Programming Languages:** Working languages include C/C++, Python and Chisel HDL. Familiar with functional programming using Scala and Haskell.
- **FPGA Development:** Experienced in FPGA prototyping and verification for research purpose. Familiar with Xilinx FPGA toolchains.
- **Cryptography:** Knowledgeable about mainstream crypto algorithms and their mathematical foundation.
- **Computer Architecture:** Experienced in crypto accelerator and on-chip network design. Understand basic CPU design and other parallel architectures. Have experience in on-chip network simulator development.
- **Compiler:** Understand basic program representations and code optimization techniques. Basic experience in LLVM development.
- **Areas of Interest:** Computer architecture, functional programming and compiler optimization for DSLs.
- **Languages:** English (IELTS 7.5), Chinese (native).