# 2018 Research Interest/Project Ideas

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## Verified User-Level Network Stack

In recent work, we have built an HTTP parser that is formally verified for memory safety, as fast as popular web servers like Apache and NGINX, and written in only 200 lines of code instead of several thousands. This is made possible by a generative programming approach, where a high-level generator emits low-level code along with formal specifications (https://www.cs.purdue.edu/homes/rompf/papers/amin-popl17b.pdf). In this project, we plan to extend the approach to a full user-level network stack. This network stack will eliminate all syscall indirection through the kernel and directly interface with network devices for improved performance, with statically proved safety guarantees. Key use cases are in network middleware, high-throughput cloud applications, as well as IoT devices.