Overview

I am looking to advise two or three MQP projects in the 2021-2022 academic year. The ideal team size for these projects is 2-3 students each. My projects tend to be focus in the networking, systems, and security areas and are primarily related to my existing or planned research grants. I often propose example project ideas, but am open to closely related ideas as well. Typically, a group of interested students will meet with me to discuss the ideas a little before deciding whether to proceed. For qualifications, I often look for experience and excellence in networking, systems, security, or substantial engineering efforts (e.g., via the software engineering class).

Existing Projects

My research projects page (available at `https://web.cs.wpi.edu/~cshue/projects/`) provides an overview of the overarching project areas I am exploring. Each area has multiple MQP or graduate projects associated with it. Each of the following three areas have overview videos and more details posted on the project page.

The research theme areas are:

- **Enterprise Networking:** We explore next-generation system monitoring, firewall, and intrusion detection techniques to help organizations prevent compromises from spreading across a network. Read more at `https://web.cs.wpi.edu/~cshue/projects/enterprise.html`.
- **Residential Networking:** We find ways to apply enterprise networking technologies to home networks at low cost and without requiring end-user expertise. Read more at `https://web.cs.wpi.edu/~cshue/projects/residential_sdn.html`.
- **Single-Use Servers:** We reimagine the existing public server model using containerization (think "lightweight virtual machine") to separate client interactions and prevent attack persistence and propagation. Read more at `https://web.cs.wpi.edu/~cshue/projects/single_use_servers.html`.

Current Project Ideas

1. **Enabling End-user Autonomy:** Can we find a way for end-users at organizations to retain autonomy to do necessary tasks without weakening organizational security? Can we use containerization, VMs, and other isolation techniques to let users have the benefits of administrator-level access without the associated negative consequences? This project would explore that.
2. **Attacker or Security Instructor?:** Can we automatically take an attack on a web server and transform it into a recommended patch for the server's code? If it cannot be automated, what is the closest we can achieve?
3. **SDN on Smartphones?:** The software-defined networking (SDN) approach allows a program to control network routing and forwarding on network infrastructure and systems. Can SDN agents on smartphones enable new network control and redundancy? Can it protect organizations from infections enabled by a "bring your own device" policy?

Next Steps

If any of these project themes seem interesting, please contact me at cshue@cs.wpi.edu and indicate which projects most interest you (in ranking order, if multiple apply). If you have project partners in mind, please include them as well. We will likely set up some Zoom meetings to chat about these potential projects for next year.