

E-Lock

The Kretschmar and CSP keypad locking system.
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ABSTRACT

This E-Lock/Doorcode system is the software and hardware that controls electronic access to doors in Kretschmar and Chan Shun Pavilion.

It controls access to doors both by scheduling time for the doors to be open to all, and by scheduling time for specific users to have access outside of normal school hours. This project involved creating a server API that delegates access, software for the new controller hardware inside the doors, a new frontend, and the migration of the old system so that it can continue to work in conjunction with the new E-Lock API.

INTRODUCTION

In the spring of 2019, a power surge in Kretschmar blew out all of the 3rd floor door controller boards. The old system is over 10 years old and replacement parts are no longer available. In addition, the platforms that the old software was built upon are no longer supported. With the third floor of Kretschmar out of commission, it was a good time to rebuild the system using more modern practices and technologies and at the same time implement new features that were desired.

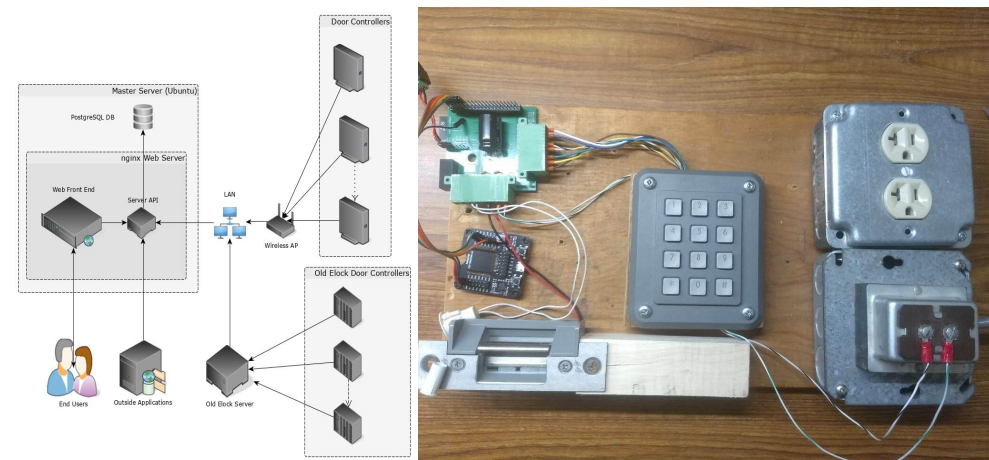
The new system uses the more modern concept of an Application Program Interface (API) to make the project more scalable and client agnostic so that any device at the doors can be used or swapped out in the future. The new door controllers are also WiFi capable to facilitate ease of replacement and installation.

IMPLEMENTATION

The new E-Lock system consists of 4 main parts. The server API, the new door controllers, the web frontend management interface, and the old elock system that was patched to use the new server API.

The new system supports more fine grained scheduling of open mode times as well as user access scheduling with the help of the iCalendar standard.

The environment operates on a client-server model where all clients are responsible for updating and syncing themselves with the server. The new door controllers also support Over The Air (OTA) updates so they can all be simultaneously updated at the push of a button.



The new and improved frontend is open to students and admins alike as it lets students have a place to change their own door code as well as see what doors they have access to. The system does more extensive logging and natively supports commands from doors for schedule overriding. There is a completely overhauled permissions system in place that utilizes groups to map users to doors as well as schedules. The system is fully integrated with CI/CD to allow one click deployment for faster updates.

CONCLUSION

This project is a great improvement over the old system. It is deployed at <https://elock.cs.wallawalla.edu> and provides a more flexible system for managing doors, users, and their permissions. The old E-Lock system was patched to use the new API and is working smoothly. All old features were rewritten and reimplemented in a more modern context. In all, over 40000 lines of finished code work together to make the system run smoothly. This project is open source so other organizations can adopt it.

FEATURES

- | Old Features | New Features |
|--|--|
| <ul style="list-style-type: none"> • Open mode schedules • Door overrides • Web management system • Crude logging • User/Group/Event management | <ul style="list-style-type: none"> • Outside application access • Closed Mode • Native door commands • Ability to track users • WiFi connection • Integration with WWU ADFS • OTA updates |

REFERENCES

- <https://tools.ietf.org/html/rfc5545>
- <https://elock.cs.wallawalla.edu>
- <https://gitlab.cs.wallawalla.edu/elock/doorcode>
- <https://gitlab.cs.wallawalla.edu/elock/controller>