Team PICA

Power Information Collection Architecture

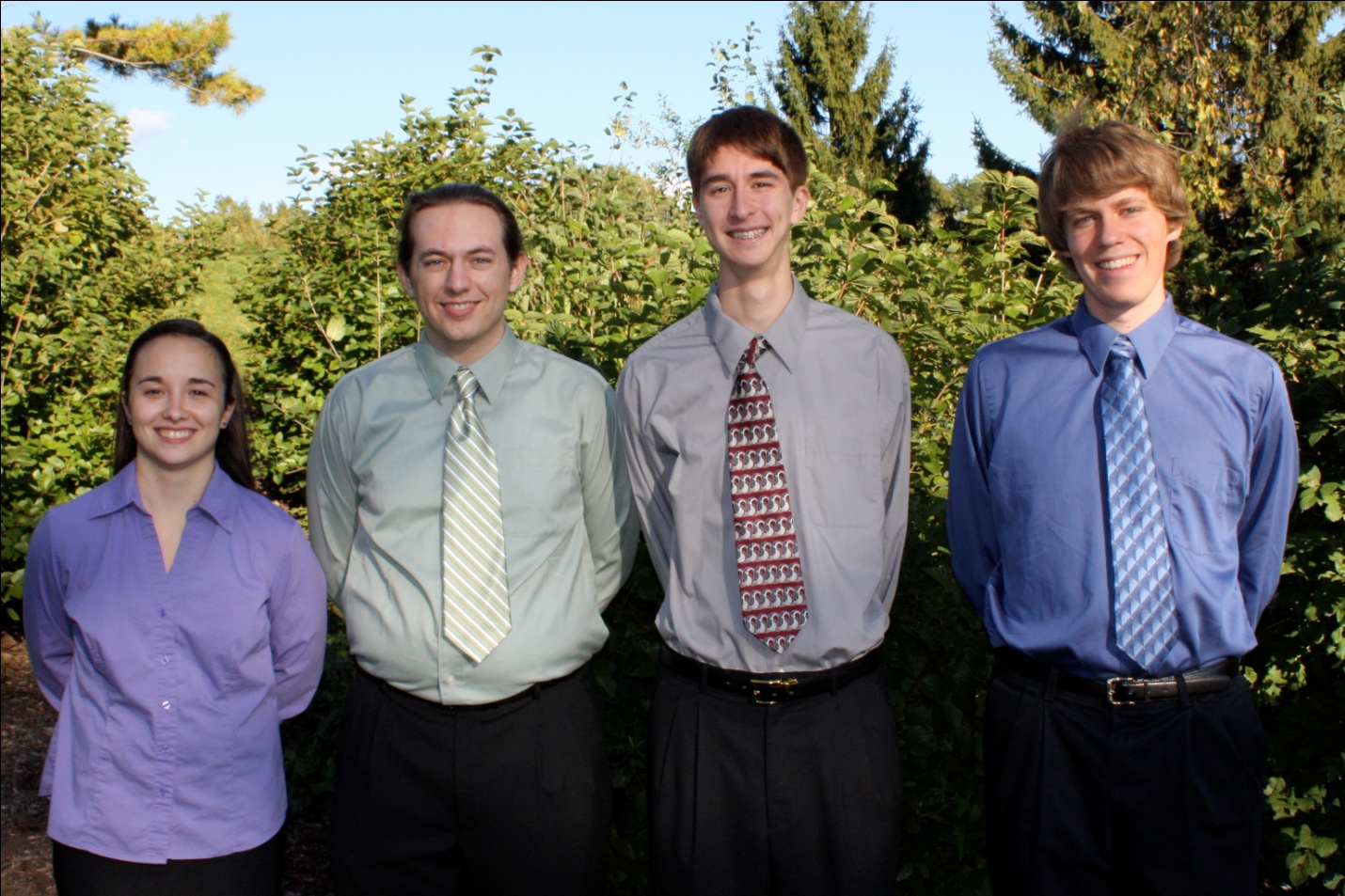
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Calvin College

Engineering Senior Design Project

Team 01: A. Ball, N. Jen, A. Sterk, K. Wiersma

**The Team:**

From left: Amy Ball, Kendrick Wiersma, Nathan Jen, Avery Sterk

**Project Description:**

Electric panels today are basically the same as a few decades ago, despite the rapid advances in technology. This can be limiting not only for power companies but also for the consumers.

As the price of electricity continues to increase, homeowners are becoming more concerned with how their electricity is being used. Unfortunately, the average homeowner has no easy or cheap way to monitor specifically when and where the power is used.

This project provides the necessary and desired information to both power companies and consumers with a unique, affordable and accurate metering device. A few especially unique features include:

1. Circuit by circuit analysis of a building for the consumer’s benefit.
2. Ability for the provider to remotely shut off power.
3. Active reporting and alerts for both the provider and consumer.

**Project Requirements:**

1. Shall provide to the power company the number of kilowatt hours used by the consumer.
2. Shall measure with at least as much accuracy as specified by United States electric codes.
3. Shall provide an interface for future power monitoring devices to extend system functionality.[[1]](#endnote-1)
4. Shall provide circuit by circuit power usage monitoring.
5. Shall have a method of reporting errors, based on a severity prioritized event log.
6. Shall provide an option for active user notification, as specified by the user in the system configuration.
7. Shall provide to the authenticated power company the ability to remotely shut off power to the consumer.
8. Shall detect and report activity that would indicate efforts to tamper with the system.
9. Shall store required usage data, critical alerts and system configuration in non-volatile memory.
10. Shall communicate with outside parties using secure CA server certificates.
11. Shall be capable of updates and restoration to previous versions without interruption of power monitoring.

**Project Status:**

The project is in the early stages of development; the project team is currently determining system goals and how to meet those goals. The primary objective at this time is to determine how the project will distinguish itself from other “smart meters” and how best to design around the features that make the project unique.

A few critical measuring and safety parts have been obtained, but they require external parts before they can be tested. Other necessary measuring and communication parts have been researched and are being ordered. Once testing occurs, supporting parts will be chosen, ordered, and integrated with the system.

1. This extension will primarily consist of adding devices that can interface over the wireless home-area-network to provide more detailed information to the consumer. [↑](#endnote-ref-1)