# Project Description

## Objective

The team seeks to design a system that would allow a user to monitor the power usage in a home on a circuit-by-circuit or even outlet by outlet basis. Such a system would provide real-time usage information via a simple to understand interface. Because our design will likely be housed in or near the electrical panel, it makes sense to include real-time monitoring of the status of all circuit breakers and other pertinent information related to power in the home. Finally, a system such as this would ideally be capable of communicating with a future “smart” power-grid to relay data to and from the power company.

## Method

The initial implementation will focus on the ability to actively monitor power usage in the home and display this information locally. Such a device would function like a one of the Kill-A-Watt devices, simply showing how much power is being drawn at that outlet at any given time. With this capability the system would be able to actively monitor the power used on an outlet by outlet basis.

Once the ability to monitor a single circuit is proven, the base station, capable of collating all the data into a single location will need to be designed. This base-station, likely housed in or near the breaker box, should be robust enough to withstand the environment that it exists in with no ill effects from extreme temperatures or other weather. In order to accomplish this, the team will need to design a communication protocol for all the devices in the network to relay their data in an order fashion back to the base station. The base station, once the data has been collected would be required to report usage information to the user. This could be done very simply by a locally hosted web-page that the user could access from any computer on their home network or via a display unit.

With these two pieces of hardware in place, the team will focus on extending the capability of the system to include other monitoring, reporting, and control features. For instance, providing interfaces to the smart power-grid; electrical generation devices (wind turbines, micro-turbines, and solar power devices), power factor monitoring, or other features deemed worthwhile that could provide added value to the consumer.

A stretch-goal for the project will be to add functionality that would allow the consumer to create a “power-plan” to control the usage of electricity purchased from the power company. This would allow the consumer to actively choose whether to use power purchased during peak or off-peak times, and to customize a plan that would provide the most usage for the amount paid. Such a system could include statistical analysis of past usage to provide the user with enough information to make the best choices.

The goal is to make this project modular, with the ability to add extra components into the system to extend the functionality. This means that once the base system is done, it could be extended to include any features that a consumer would find useful.

## Evaluation

Our project will be evaluated based on the simple criterion of: does this product provide an added value to the user. This means that the product is capable of actively monitoring the consumer’s power usage in a way that is non-intrusive to their way of life, nor intrusive to their power usage. Equally as important, our project must be equally as accurate as the current meters already in use by the electric companies.