

Outletify: A Project for CSCI 3308

Who

- Alan Moy
- Jonathan Wehrend
- Austin Glaser
- Joseph Vostrejs

Title: Outletify

Description

Outletify provides two key features: energy usage tracking, and home automation. Two distinct hardware components will make up a single Outletify system. Microcontrollers integrate with outlets to allow for low level control and usage detection, and a central server will be the main point of control for all microcontrollers. Energy usage tracking features will monitor and log the times outlets are in use, and the server will collect data and present it to the user with straightforward graphics and statistics over a web interface. This same web application will also serve as a hub for all home automation capabilities, allowing the user to control and automate household activities and appliances. By scheduling regular tasks and logging historical usage, Outletify will grant users finer control over their house - what's running, and what isn't.

Vision statement

Outletify is the simplest way to manage and monitor all the household technology you depend on. Lower your bills, reduce your environmental footprint, and make your life easier by leaving menial tasks to the machines.

Motivation

Many people today are concerned with managing their energy usage, whether motivated by their utility bills, addressing climate change, or both. We are developing Outletify to address this issue. By creating an affordable, easily-installed and well-supported device to track power usage, we can allow more people to maximize their energy efficiency.

Risks

- Risk: **Hardware component**
 - By incorporating a hardware component into our project, we have a necessary increase in scope. We will need extra tools to program and debug our devices, and there's up-front work required before we can move into software development proper
 - Mitigation:
 - * We can decouple the sections of our project by developing a sensor emulator that can run on a personal computer. This will allow the backend and database-level development to proceed regardless of the hardware state, as well as allowing a fallback for demonstration if the end-of-semester deadlines proves too ambitious
 - * We have two team members with embedded hardware experience.
 - * We will build our demonstration hardware primarily (or exclusively) from off-the-shelf components, to avoid the extra time and expense incurred when building a custom circuit board
- Risk: **Database Management**
 - None of our current group members have experience with database usage. We plan to use a database to store usage history.
 - Mitigation:
 - * We plan to use the professor and TAs as resources
 - * We will limit the complexity of our database to facilitate debugging
 - * We can fall back to a simpler but less scalable option for demonstration purposes (i.e. storing data as simple text files)
- Risk: **Schedule**
 - This project necessarily has a hard deadline of the end of the semester; any slippage will mean that come demonstration time we will have to demonstrate a partially functional product
 - Mitigation:

- * We will focus on early and partial functionality, so that at any point we are capable of demonstrating some subset of our requirements.
- * To that end, we will minimize our features' dependence on one another (to the extent that is possible) so that it's more feasible to implement them in parallel.

VCS

Github

- <https://github.com/austinglaser/csci3308-project>

Requirements

User			
ID	Description	Agile Sizing (1-10)	Priority
U.01	As a user, I want the usage data presented to me in a meaningful and easy to read way so that I know where electricity is consumed in my home	5	High
U.02	As a user, I want the sensor-outlet configuration to not be overly complicated so that setup will not be frustrating	4	Medium
U.03	As a user, I want the sensor to consume less than 500 mW so that getting the data is not expensive	2	Medium
U.04	As a user, I want the each sensor to cost less than \$20 so that I have an incentive to buy it	2	Low
U.05	As a user, I want to be able to retain the ability control appliances via physical switches so that simple tasks do not become complicated	2	High
U.06	As a user, I want to access the website via both desktop computers and mobile devices so that I have maximum flexibility with remote control	5	Medium
U.07	As a user, I want sensors to communicate with my personal computer for association and configuration so that the user interface can be straightforward and intuitive	6	High
Functional			
ID	Description	Agile Sizing (1-10)	Priority
F.01	As a user, I want the data reported to be accurate to within a Watt-hour so that the usage statistics are meaningful	6	High
F.02	As a user, want sensors to determine when appliances are on and off so that I can track energy usage.	7	Critical
F.03	As a user, want to collect energy usage data so that I can reduce overall energy usage.	8	Critical
F.04	As a developer, I want sensors to send data to a server so that I can process it in one place.	7	Critical
F.05	As a user, I want sensors to be able to enable and disable power so I can turn things on and off.	8	High
F.06	As a user, I want to schedule things to run at certain times, so I can automate regular tasks.	6	High
F.07	As a user, I want the sensor to be powered from its own outlet so that battery life is not a constraint	4	High
F.08	As an administrator, I want to be able to update a sensor's firmware remotely so that users can easily be provided with bug fixes and feature updates	9	Low
F.09	As a user, I want sensors to communicate with my home's WiFi so that there's no extra hardware involved in system setup	8	High
Non-functional			
ID	Description	Agile Sizing (1-10)	Priority
N.01	As a developer, I want the software used to be open source so that project development is cost-effective	2	Medium
N.02	As a developer, I want the web server to be secure so that the data will not be tampered with	2	High
N.03	As a developer, I want the previously recorded data to still be intact if the sensor should fail so that the time recording wasn't wasted	5	Medium
N.04	As an administrator, I want user data stored on a sensor to be secure so that the sensor is not a security vulnerability	6	High

Methodology

- Agile

Project Tracking software

Trello

- <https://trello.com/methodsandtools>

Project plan

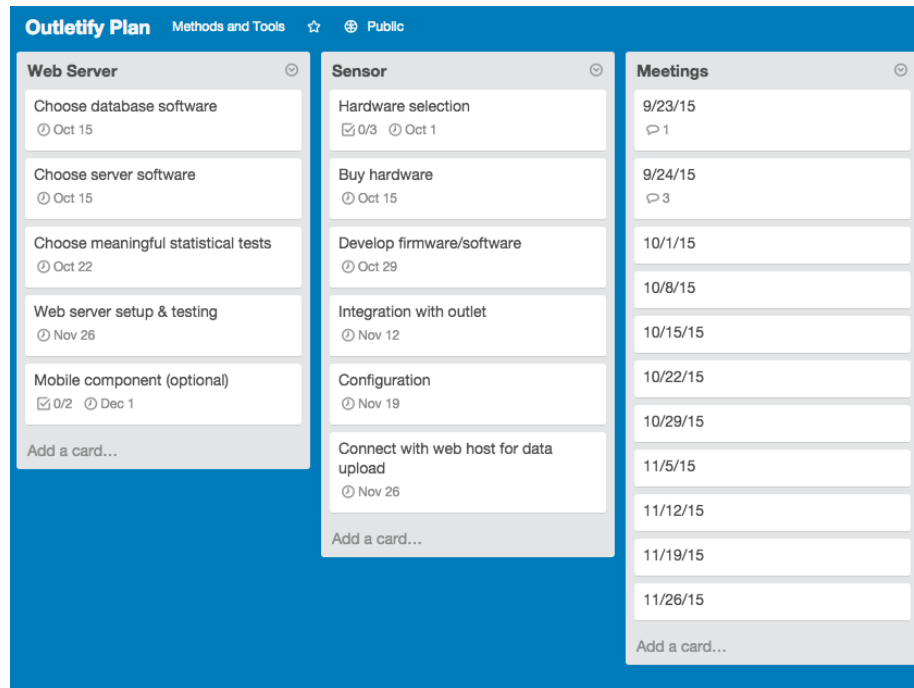


Figure 1: Project Plan in Trello