SmartSurge

Surge protector controlled wirelessly via Wi-Fi aiming to significantly reduce energy consumption

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The Problem

Every year, roughly $19 billion worth of electricity is wasted due to so-called 'vampire energy'– the energy that appliances, electronics, and other household equipment use when left plugged into an outlet. The International Energy Agency estimates that 10% of an average household's utility bill is used on vampire energy. A lot of this energy is wasted because consumers either forget to or find it too inconvenient to unplug devices and/or switch off power strips every time they leave the house. According to a study conducted by the Natural Resources Defense Council, the five worst energy "vampires" are set-top boxes, audio gear and game consoles, televisions, desktop computers, and modems. These devices are also often almost always plugged into surge protectors due to the fact that they have many supporting components or are placed next to each other. Therefore, a few surge protectors that are turned off when not in used could save a considerable percentage of this wasted energy.

Physical Design

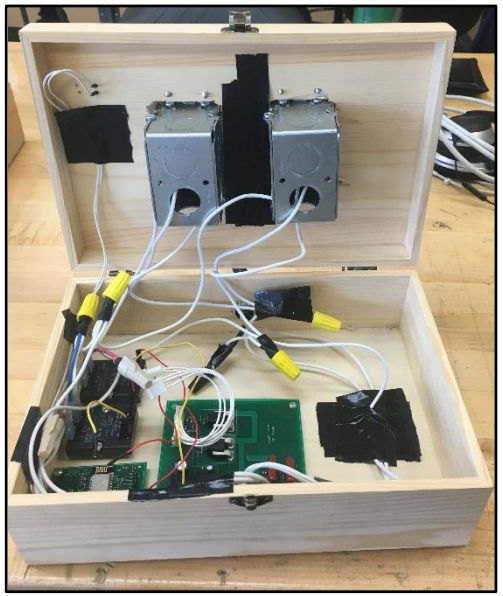
The left picture shows both of the relays installed in the device, and the right picture shows the device's shell before the outlets were installed.

The Solution

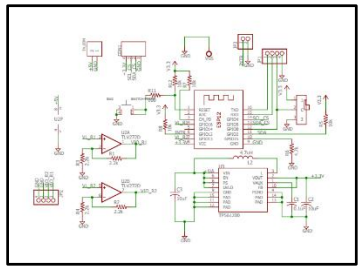
In order to reduce the energy wasted by a consumer, we have designed and built a wirelessly controlled surge protector that can be turned on and off using a mobile application. We were able to create a device that uses extremely low power, thus improving the user's ability to save energy. We enabled the user to selectively deny power to specific outlets on the surge protector so that some devices can always be powered, such as alarm clocks, while other devices can be selectively powered, such as game consoles and televisions. SmartSurge is also able to monitor power levels from the application so that the consumer can adjust their power usage accordingly and more accurately predict how much energy they will save.

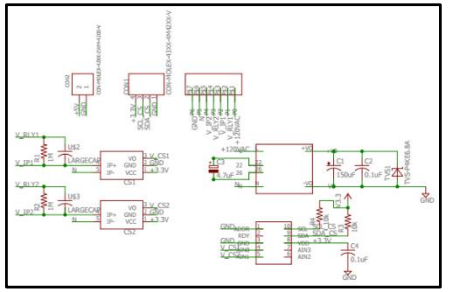
Completed Physical Model

To the right, the completed SmartSurge is opened up to show its inner components, such as both boards, both relays, and two outlet boxes. On the bottom right, the two outlets can be seen on top of the device with a red toggle switch controlling the relays. The image on the bottom left highlights the power cord constructed manually that attaches to the back of the SmartSurge a. Our device can handle up to 120 VAC.

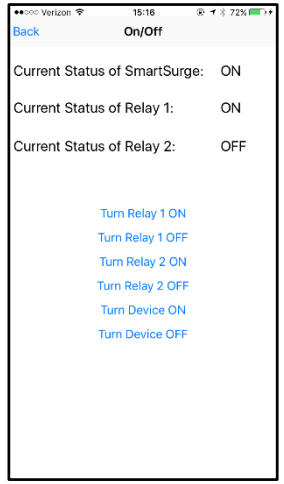


Board Design





Mobile Application



After connecting to a server via MQTT, the SmartSurge mobile application has three main functionalities:

1) Monitor energy consumption through current values from each outlet

2) Set specific dates and times to power on/off the device

3) Control power of both outlets on the device, turn on/off anytime