



Senior Design Project Proposal

Department of Electrical and Computer Engineering, NDSU

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1. Project Title: **uGREEN: A greener campus by energy consumption surveillance**

2. Project Description:

Awareness of how much energy we consume can help us change our consumption behavior. Therefore non-intrusive ways of monitoring, analyzing, and reporting our energy footprint is desirable.

The primary goal of this project is to design and implement a campus-wide energy consumption surveillance tool with an online visual interface. The twofold purpose of this tool is: (i) provide real-time energy consumption of campus buildings, accessible via the Internet and (ii) enhance awareness of energy consumption. The outcome is to stimulate a collective change in energy consumption behavior and inspire users to be more energy efficient, both of which will lead to energy savings.

3. Project Design Objectives:

The following are the main steps. In a first version of this project we will focus on the ECE building only.

1. Existing energy meters will be used without rewiring or retrofitting to record energy consumption data as a function of time. Optical sensors (cameras) will be used to read energy meters and transmit real-time energy usage to a centralized server by using a dedicated or existing network.
2. Energy consumption measurements from each NDSU building will be time stamped and recorded on a central server. Data collected in this way will be aggregated and analyzed in order to compute energy usage figures of merit. For example, energy usage can be logged on a periodic basis. This can be visualized using appropriate plots that will point out the time of the day with peak energy consumption.
3. The archived data will be analyzed using visualization tools and mapped on to an energy-dashboard available online via the Internet. This dashboard can be displayed on every campus computer. The awareness of energy usage patterns can inspire one to be energy efficient.
4. Maintain a project website.

4. Project Prerequisites:

Some experience with HTML and C/C+ programming. Basics of image processing, networking, and communication. Knowledge of Matlab would be a plus.

Most importantly, students should be self-motivated to learn new interdisciplinary approaches that bridge knowledge and skills from electronics, wireless communication, image processing, and HTML and C/C++ programming.