

Introduction

IPRO 337, The Zero Energy Lab, is an ongoing development of the fourth floor of Machinery Hall into a working lab space for future IPROS and various other testing and experiments. This lab space will continuously be improved to become an example of a energy neutral space for the IIT campus as well as other universities and companies that wish to improve their energy consious designs. The testing done in the lab will also be used to find better energy saving products that can be used in the Zero Energy Lab as well as in other venues.

Subgroups and Goals

Wind Team

The wind team was in charge of taking readings, finding local wind readings taken for extended amounts of time, researching the various types of wind turbines as well as the best of the chosen style to produce the greatest amount of energy. After finding the best solution, the team also had to research the best mounting system to use so to affect the building as little as possible and yet still give the turbine the optimum height and stability.

Golf Cart Team

The golf cart team was responsible for redesigning and fixing the used golf cart to make it into the lab's mobile battery bank and work station. By studying and documenting the wiring and mechanical fasteners, the team decided on the best way to dismantle the cart so it could be transported to the fourth floor of Machinery Hall for repairs, rewiring, and painting.

Lab Space Team

The lab space team was given the task of continuing some of the renovation process for the entire fourth floor lab area. This subteam worked on designing work tables with storage that could be built with little effort and removed easily. Along with the work table, a banner system was devised that could specify what experiments and IPROS were being held in the lab.



The background

The fourth floor of Machinery Hall has long been used as a storage space for unused furniture and equipment. Before that, the whole floor was dedicated to metal smelting and processing. These major past uses have left the space with uneven

concrete floors, but a large open space with little major issues. Right now, the space has been slowly cleared of the majority of the unused furniture and equipment. The roof has a photovoltaic array that feeds lab space and the already completed office. Even with the array, the roof still has room for more panels and other green technologies. The battery bank for the PV array is 4 - 12V batteries, and they are situated on the mezzanine in the lab. The batteries are sufficient for the array now, but with additional panels or other energy gathering technology, those batteries will not be enough to hold all the energy generated.



Wind Team

The wind team aimed at researching and installing wind turbines on the roof of Machinery Hall. This group worked with IPRO ### to use their wind turbine for testing and wind readings. The team started with wind information taken from various locations around Chicago to find the closest readings to match with the conditions around Machinery Hall. From here the team looked for wind turbines that could work with the wind conditions as well as produce the best energy readings possible for those wind speeds. Since we could use the

donated turbine for our testing, we started with how to intigrate the turbine with another battery bank as well as the structural system of the building for stablizing. Our IPRO wanted to try the turbine to fully understand the energy potential without disrupting the roofing or

the building's structure. Therefore, we arranged to set up the turbine at the south end of Galvin Library.

