Assessing the Performance of Energy Efficient Housing

Overview
The Penn State Energy Efficient Housing Research Group needed help in developing a residential energy monitoring protocol. As a group, we had to research and develop a robust, adaptable protocol for residential energy monitoring and feedback. By calculating heat transfer and analyzing energy data, we were able to create a protocol that provides the researchers with the information to create informed decisions and feedback for residence.

Objectives
The purpose statement for this project is to create an adaptable and robust energy monitoring and feedback protocol that improves occupant understanding of energy usage and reduction techniques using current, affordable technology in a way that is responsive to the Penn State Energy Efficiency Housing Research group, the homeowner or tenant, and the Learning Factory capstone so that energy conservation and consciousness are increased, motivates action in residential settings and aids in making energy efficient design decisions.

Approach
- The team discussed with the EEHR team to identify the problem and brainstorm solutions
- The team produced a survey to distribute in order to gain feedback
- Many different potential devices were investigated for implementation
- Energy data and bills were examined from the various sites of interest
- A spreadsheet was developed to analyse the energy data for efficiency from a home
- The sponsor elected to work exclusively with a TED device
- TED device implementation and installation was streamlined
- Various homes’ data were collected and compared to one another
- The data was compared to the energy bills and the spreadsheet that was developed
- The results indicated the areas of improvement and the cost per level of improvement

Outcomes
- The sponsor will receive a protocol for energy monitoring implementation, a spreadsheet for energy auditing and a survey to distribute to further projects that help identify social motivations
- The setup and implementation time for energy monitoring will be more streamlined and issues that were encountered were diagnosed for faster fixes
- The spreadsheet would develop a scoring for the home in question and identify potential improvements
- The survey would help identify the best way to communicate the recommendations and display the data for best understanding.