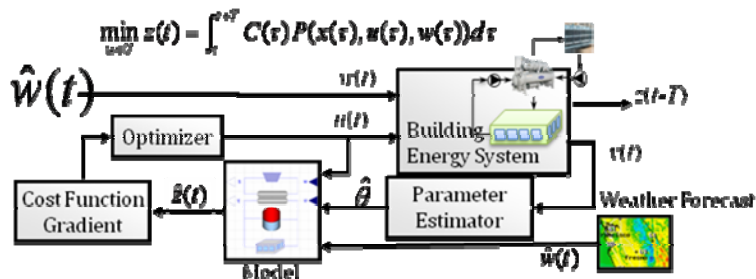


## M. ENG. AND UNDERGRADUATE PROJECT ANNOUNCEMENT PROJECTS IN SMART ENERGY SYSTEMS WITH PROF. BRANDON HENCEY

The projects below are part of a larger effort to develop methods that enable drastic efficiency improvements via effective design, integration, control, optimization, and monitoring of energy

systems. Examples of energy systems of interest include wind energy, buildings, and microgrids. Catalyzed by the ubiquity of cheap processing power and communication, systems perspectives are poised to revolutionize the design, operation, and maintenance of energy systems.



**Desired Skills:** Individuals should have a subset of the following skills  
Programming in MATLAB, C, C++, and/or Python; conceptual understanding of basic thermodynamics, computer aided design experience, machining, communication and wireless network protocols, electronics design, SQL databases,

### Potential Projects:

1. **Fault Detection and Diagnostics for Building Systems:** Develop and implement fault detection and diagnostic algorithms for building systems. Design a user interface that prioritizes faults and provides context for building operators.
2. **Control-Oriented Building System Modeling:** Develop and validate models of building energy system components (rooms, air handling units, etc.) that are amenable for optimization and control design.
3. **Energy System Dynamic Optimization Platforms:** Evaluate platforms, such as JModelica, TOMLAB, and AMPL, for the viability as a foundation for developing an energy system optimization toolbox.
4. **Modular Scaled Building Test Bed:** Design a 1:10 scaled reconfigurable test bed for comparing building energy management control system performance against simulations.
5. **Wireless Plug and Play Sensors and Actuators:** Evaluate prospective wireless protocols and hardware, such as IEEE 802.15/Zigbee, for viability in an integrated plug and play building energy management control system.
6. **Energy Management Control System Data Interface:** Development an algorithm that acts a link between an energy management control system and control and monitoring algorithms. The project will involve: employing web services (e.g. SOAP) to read/write data to/from the energy management control system over the web; building a buffer database for local data access; design of an interface for MATLAB/Python algorithms.