MEng Design Project Announcement – 2017-18 AY

Project title: Dilmun Hill Barn Project

Brief Description of Design Project Goals:

Overview:

Dilmun Hill is the student-run organic farm at Cornell University. For engineers, the farm is a blank slate for developing technology and/or infrastructure with the goal of strengthening regional food systems.

A study is firmly underway to determine the features and economical design of a barn that can best serve Dilmun Hill long into the future. An interdisciplinary team of students, faculty, and staff have begun developing a programmatic analysis of the space and designs for a new structure. This team is composed of students and faculty from the Colleges of Engineering, Architecture, and Agriculture and Life Sciences. Together, we plan to leverage the human resources and partnerships available at the university to construct a barn that will implement innovative and ecological architectural design and farming technology, serving as a model for both small and medium-sized farming operations, in addition to other college farms seeking sustainably designed infrastructure.

The new barn will include educational spaces for labs and workshops, vegetable processing facilities, and farm equipment storage. By utilizing solar power and other passive energy technology developed by Cornell faculty and students, we aim to construct the barn to a net-zero energy standard. In addition, we hope to integrate technology and hardware developed by students to create a “smart” barn.

This project offers a space for engineering students to pursue senior design, master’s, and independent study projects relating to IOT and embedded technology, remote and autonomous control, monitoring systems, and sustainable design (to name only a few).

Specific MEng Contribution:

We are currently recruiting MEng students with an interest in IOT and embedded technology, remote and autonomous control, monitoring systems, and sustainable design. Potential MEng projects range over several fields (but please feel free to reach out to the ECE field advisors if you have your own project proposal that you believe would be a good match):

- Fine grained building temperature control via IOT.
- Off-grid power harvesting and storage, perhaps low-head water power, or hydraulic ram, or solar.
- Rainwater collection and control.
- Diversion control, storage monitoring and warnings.
- Root monitoring and water monitoring of small plants via impedance tomography.
- Schedule based irrigation with leak detection. This project includes IOT water valve development and base-stain visualization systems to monitor water flow and system issues. This project will also establish a farm-wide network for other field-based projects.
The MEng project must be a piece of the larger project which can be completed in the 1-year time frame of the MEng program. The emphasis is on practical, usable systems, so packaging and robust mechanical design is essential. A typical ECE project will be a control system, or electronics package, in support of the larger project goals.

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**Project Web Site:**  
[http://blogs.cornell.edu/dilmunhillbarnproject/](http://blogs.cornell.edu/dilmunhillbarnproject/)

**Number of MEng Students Needed:**  
2-5

**Required Skills:**  
Embedded systems, including LINUX experience is very desirable. Depending on the project, some knowledge of energy systems, farming, or gardening is useful.

**Estimated Project Time Frame:**  
2017-18 Academic Year, Two (2) Semesters