

UCONN Senior Design Job Ticket

Sponsoring Organization:

Project Title: Sustainable greenhouse seedling warming system

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The Engineering Challenge:

Northwest Corner Farm is located in Winchester, CT. We produce ~60 varieties of ~30 vegetables and ~12 varieties of herbs, as well as maple syrup, honey, and cultivated mushrooms. Our methods are exclusively organic, and we expect to receive organic certification in 2024. In 2023 (our first season), we successfully operated a 20-week CSA and also developed a number of local direct wholesale accounts. We were certified to accept SNAP and were able to set aside 20% of our CSA memberships for food-insecure families. In addition, as the 2023 season progressed, we began to provide produce to food banks/pantries through the Northwest CT Regional Food Hub. Through the Food Hub, we also began to sell to schools, including schools in Winchester, Norfolk, Torrington, Litchfield, and Shepaug. Despite our limited capacity (one-quarter of an acre, and one high tunnel) as well as a late start due to weather and other circumstances, we were able to produce over 7,200 pounds of food.

Maintaining the highest standards of sustainability in all of our farm operations and practices is a non-negotiable component of our vision. The farm purpose statement is to “create a modern and sustainable farm that produces top-quality products, while also contributing positively to the local and global community.” Because we are building out the farm infrastructure from scratch, we intend to build a fully renewable-energy farm infrastructure by electrifying all operations of the farm and powering them from on-farm solar as soon as feasible. In the meantime, we are taking interim steps such as avoiding carbon fuels in the high tunnel, choosing renewable electric sources from the grid, investing in an electric on-farm utility vehicle, etc. With regard to the high tunnel, we wish to avoid heating the entire space 24/7 directly with propane or other fossil fuels (versus electricity). The idea is to generate a “hot box” similar to a cold frame that is placed on top of the seeding tables, heated with Agritape heat mats controlled by micro controllers enabled with wifi for remote monitoring.

Note: This is an Innovations on Small Farms project partially funded by the USDA. It will have one or two students from CAHNR supporting the project as well and there are some materials on a HuskyCT site to introduce you to the project, to help the team get started and to provide feedback on the project. There is also an opportunity to participate in a Farm Hack event in January 2025 to share your preliminary work with other farmers and to get feedback.

Description of Problem/Project: The objective of this project is to design and develop an efficient, seedling heating system run entirely on electricity. As this is a design that will potentially be shared with other farms, the design should optimize the configuration with regard to ease of construction and availability of materials, ability to monitor function remotely, and portability.

Expected Deliverables/Approach:

[Sample]

- Research current designs in the market if available.
 - Research system components for broad availability and reliability
 - Fabricate working prototype and consider scalability
 - Conduct testing for environmental controls
 - Provide all:
 - Bill of Materials
 - Set of instructions for reproduction
 - Analysis results
 - Reports
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- **Is there a specific software package required for the projects?** Y ___ N x
Which package (name/version) _____
 - **U.S. Citizen/Person (green card) Required?** Y ___ N x
 - **Will Export Controlled data be used in project (EAR/ITAR)** Y ___ N x
 - **NDA/IP Agreements required?** Y ___ N x
 - **Other considerations:**