



Project Sierra 1

Intelligent Solar Power System Design

ELECOMP Capstone Design Project 2026-2027

Sponsoring Company:

SANCTUARI

Box 559

Warren, RI 02885

<https://sanctuari.org/>

Company Overview:

SANCTUARI is a 501(c)(3) nonprofit wildlife care organization improving wildlife survival rates by leveraging modern technology. We are privately supported without federal, state, or municipal funds and are unaffiliated with other Rhode Island wildlife organizations.

Technical Director(s):

Joe Moreira, Sr. Tech. Dir.,
Founder & Board Chair, Sanctuari
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Grey Daly-LaBelle & James DeMello, Assoc. Tech. Dirs.
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Project Motivation:

Increasingly unpredictable and spiraling energy costs continuously prompt the acceleration of our charity's deployment of green, distributed, "off grid" and "balcony" solar energy delivery systems.

Anticipated Best Outcome:

Successful design, prototyping, testing, and deployment of several, not necessarily all, team-selected solar energy systems as described in the Project Details section.



Project Details:

Sanctuari has various campuses and marine vessels which will benefit from solar energy systems. The team may choose which projects interest them most. Work priority will be set by those preferences.

Design of site-specific solar photovoltaic power systems is desired for multiple campuses. Off-grid with local energy storage, “balcony solar,” and grid-tied are all within scope, as are roof-mounted and ground-mounted systems. Both fixed systems and sun-tracking (“traxle”) dynamic systems are possible. Also, design of site-specific solar heating/hot water systems is possible.

There are two marine vessels within scope for this project. One is a ~50’ twin engine diesel, which requires streamlining of electrical systems, the addition of a solar panel array, and possibly supplemental battery-electric propulsion. The second is a 21’ vessel requiring battery electric propulsion and a new buildout of electronic systems architecture.

Composition of Team:

2-3 Electrical Engineers

Skills Required:

Electrical Engineering Skills Required:

- Quick learning; high curiosity; comfort with various power technologies/schemes.
- Propensity for meticulous analysis and testing, especially with power system design and power budgeting.
- Self-motivation respecting research of existing, relevant solutions; capability to aggregate and compare strengths/weaknesses of “competitors” and useful related tech.
- Accountability and willingness to “own” the system design as a good startup CEO would.
- Desire to be hands-on with design and testing, to optimize and wring out design performance, allowing the system to “tell the designers what it needs next.”
- Understanding of various renewable technologies.
- Understanding of engineering for minimizing ecological footprint.
- While not “electrical engineering skills,” students with demonstrable compassion for animals and deep concern for animal welfare are desired.



Anticipated Best Outcome's Impact on Company's Business, and Economic Impact:

Successful execution will allow us to rapidly reduce our expenditures for power and heat, leaving more funds for direct animal care advancement. Successful execution will also substantially reduce our ecological footprint, thereby also helping animals.

Broader Implications of the Best Outcome on the Company's Industry:

We lead by example and are well regarded as being at the technological forefront of several fields which intersect our mission and operations. This project will help us to help others in deploying cleaner, "greener," more economical power (and repowering) solutions.



Appendix A: AI Use Policy – Project Sierra 1

Allowed

Students may use AI tools for

- ✓ brainstorming support
- ✓ concept development
- ✓ literature and publicly available documentation review
- ✓ software development
- ✓ debugging
- ✓ data analysis
- ✓ test development
- ✓ non-proprietary paragraph editing
- ✓ non-proprietary single-slide formatting
- ✓ preparation of project deliverables

Not Allowed

- ☒ note taking or transcription of meetings
 - Using AI in violation of university policies, applicable laws, or course-specific rules identified by capstone instruction team and project-specific rules identified by the technical directors.
 - Entering proprietary, confidential, personally identifiable, security-sensitive, or otherwise restricted information into an AI system without authorization.
 - Submitting AI-assisted work without understanding, reviewing, verifying, and appropriately disclosing its use.



- Submitting entire documents or presentations to an AI system for editing or formatting.

- Any unchecked items from the allowed list above.

Requirements

- If any use is allowed, AI tools may only be used to enhance, but not replace, students' technical reasoning, engineering judgment, and understanding.

Students must be able to explain, justify, and defend all submitted designs, code, analyses, test results, documentation, and conclusions.

- During the first two weeks of the project, the student team shall work with the

Technical Directors to:

- Identify any proprietary or confidential information that may be involved in the project.
- Determine what information may or may not be shared with AI systems;
- Identify the AI tools, models, accounts, and configurations approved for project use; and
- Document any project-specific restrictions or approval requirements.

- Students shall transparently document the uses of AI using the URI CYPHER AI Usage Marking guidelines (<https://web.uri.edu/cypher/ai-marking/>). A workshop is planned for September to familiarize students with these guidelines.

- Students retain full professional responsibility for all design decisions, analyses, implementations, testing, documentation, presentations, and final deliverables, regardless of whether AI tools contributed to the work.