View results

Respondent

4 BILL Waltz

09:54

Time to complete

1. Date of this semester progress report submission *

12/19/2024

2. Name of project exactly as it was listed in your award letter *

Illini Solar Car - 4th Generation Solar-Electric Vehicle

3. Date of original award letter *

11/21/2024

4. Date of expiration listed on award letter (or on scope change approval if more recent) *

11/21/2026

5. How much was your award (i.e., original award plus any approved budget increases)? *

$100,425.58

6. How much of your award has been spent to date (in dollars)? *

$0

7. Date of forecasted project completion *

July 2026

8. Have you submitted one or more semester progress reports previously? *

- ○ YES
- ◉ NO

9. Describe, in detail, what has been completed on the project since the last semester progress report (or since the project commenced if you have not yet submitted a semester progress report)? *

Since the beginning of the project, we have conducted a multitude of meetings regarding the design and function of our fourth-generation vehicle. On the mechanical side, the primary focus has been designing the critical systems on the car including the aero shell, suspension system, braking system, chassis, roll cage, and steering. The aero shell has had 26 iterations so far and is at a CdA of about .12, progressing towards our target of .1. Full mold designs and foam stock have been prepared for the aero shell. Several iterations of different suspension styles including double wishbone, MacPherson strut, and trailing arm have been designed in CAD and are being developed to target in house manufacturability. Research has been done looking into master cylinder selection and orientation, and a brake assembly is in the works. Steering calculations and a preliminary CAD model have been made to determine proper Ackerman steering. A molded mono-chassis has been created for each suspension setup, as well as a plan for post machining and layup processes. Roll cage and driver compartment designs have been fleshed out with stress analyses planned. Finally, our communications with sponsors for solar array and battery sourcing have made good progress.

10. Describe, in detail, the project's challenges/obstacles since your last semester progress report (or since the project commenced if you have not yet submitted a semester progress report)? *

A major challenge with the plug design of the aeroshell mold has been our current lack of minimal high density machinable tooling board required to assemble the plug. The minimal amount of tooling requires that we make a jigsaw of the many different sizes of board we have to make a shell of low density expendable tooling board on the bottom, and a skin of high density tooling board on the exterior of the shell outline, in order to create a machinable skin of one uniform density foam. This means that with our current mold designs, we will need to cut our available foam into many different slices to accommodate the different sizes.
Another challenge has been waiting for regulations for ASC 2026, the race we are designing our fourth car to compete in. This affects our design process in all areas. One of the major issues that has set us back is the battery size regulation, which was indicated to change drastically. To keep on schedule, we have had to focus mostly on the mounting and exterior of the battery enclosure, as we have had no size specifications. In order to source the battery itself, we have been reaching out to sponsors and doing research on different battery options.
Without extensive machining resources available to students on campus, we face a challenge with the machinability of our parts. We have the option to either design all metal components and molds to be completely machinable in house, which with our current capabilities limits us to design all components to be manufacturable using 3 axis machining, or we can design for more complex machining operations, but must pay out of pocket for a company to manufacture for us as we do not have a sponsorship. To save money, we have currently been going the route of complete in house manufacturability, making the car much more difficult to design.

11. Describe, in detail, the project's successes since your last semester progress report (or since the project commenced if you have not yet submitted a semester progress report)? *

Since the project commenced, one of our biggest successes was our onboarding process, in which we secured dozens of talented students from many different colleges to work with us on the car. Interest this semester was much greater than prior years, allowing us to be more in depth during the onboarding process. We began teaching new recruits CAD using Siemens NX over the course of four weeks. Returning members mentored the recruits, assisting with any difficulties and displaying the friendly nature of the club. Those who finished the onboarding process were officially made members. A record high sixty members joined.
Since our last report, Illini Solar Car made significant strides in developing our innovative four-wheel asymmetric catamaran-style solar car. This design marks a bold departure from previous models, bringing new opportunities for engineering, creativity and sustainability.
A major achievement has been the creation of a groundbreaking shell design that combines aerodynamic efficiency, structural integrity, and aesthetic appeal. The asymmetric catamaran configuration reduces drag and optimizes solar panel placement for maximum sunlight exposure. This effort demanded extensive research and testing to ensure its feasibility and performance. We now have a shell design that has a coefficient of drag that is comparable to other winning American Solar Car solar cars.
To support the new shell, we engineered a custom suspension system tailored to the car's unique weight distribution, enhancing stability and maneuverability. We also designed a lightweight roll cage that meets safety standards while protecting the driver. Additionally, an enhanced braking system was designed for reliable stopping power, even at high speeds, further contributing to the vehicle's safety.
The driver compartment, redesigned for new regulations, works for a cutting-edge asymmetric catamaran. Aerodynamics have been central to our progress, highlighted by a sleek canopy that reduces drag while maintaining visibility and protection for the driver. While this canopy is still a work in progress, it shows the capability of the team to make a new design in short notice.
These achievements were made possible through the collaborative efforts of our multidisciplinary team, involving rigorous testing and iterative prototyping. This progress not only positions us strongly for upcoming competitions but also demonstrates our commitment to advancing solar vehicles and sustainable technology. This period has been one of immense growth and marks a significant step forward for our team.

12. Did your project have any changes to its team that SSC should know about (e.g., project lead, faculty/staff advisor, departmental financial contact)? *

NOTE: If yes, please complete the SSC Project Contact Information Change Form located at this link: https://forms.office.com/r/uBjx9nmNpG

- ○ YES
- ◉ NO

13. Complete and upload the semester financial documentation for your project. You should reflect all expenditures since your last semester project report. We strongly suggest that you also upload supporting financial documentation from Banner for your award CFOP. NOTE: When your project is completed and/or expired (whichever comes first), any remaining project funds will be transferred back to the SSC.

    https://studentengagement.illinois.edu/sites/default/files/2024-09/SSC-Budget-Timeline-SEMESTER-PROGRESS-REPORT-template.xlsx
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    FA24 SSC Budget Timeline Semester Progress Re_BILL Waltz.pdf

14. (OPTIONAL FOR SEMESTER REPORT) Upload project marketing and/or media not previously submitted in semester progress reports.

    NOTE: Project marketing and/or media must include SSC's logo and/or a statement of which fee(s) funded the project.

    4thgenMedia_BILL Waltz.pdf

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