



College of Engineering

**Senior Design Capstone Program Project Charter**

**Project Title: Race Car Ergonomics Jig (Phase II)**

**Project Sponsor: SDSU Aztec Electric Racing (AER)**

**Assigned Project Number: 18**

***Department of Mechanical Engineering***

**Fall 2024 – Spring 2025 Capstone Senior Design Program**



Zachary Caceres-Batista



Sean Hedgecock



Jakob Bravo-Calderon



Victor Velazco



Alexandria Ng

**Project Title**

- Race Car Ergonomics Jig (Phase II)

**Assigned Project Number**

- 18

**Project Student Names, major, email address and phone number:**

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- Victor Velazco, Mechanical Engineering, [vvelazco1162@sdsu.edu](mailto:vvelazco1162@sdsu.edu), (858)388-7011
- Zachary Caceres-Batista, Mechanical Engineering, [zcaceresbatist1877@sdsu.edu](mailto:zcaceresbatist1877@sdsu.edu), (408)508-2233
- Jakob Bravo Calderon, Mechanical Engineering, [jbravocalderon2030@sdsu.edu](mailto:jbravocalderon2030@sdsu.edu), +1 (619) 806-1321

**Team Identified Project Team Student Leader Name**

- Alexandria Ng

**Sponsor Company or Organization Name**

- Name: SDSU Aztec Electric Racing
- Website: <https://aztecelectricracing.sdsu.edu/>

**General Company Description**

- Aztec Electric Racing (AER) is a collegiate engineering team from San Diego State University that designs, manufactures, and races a Formula-style electric vehicle for the annual FSAE EV competition. AER was founded in Fall 2016 by a team of 12 members that aimed to prepare students with the hands-on skills and practical knowledge they need to enter the engineering workforce.

**Sponsor Primary Point of Contact Name**

- Sofia Goulart
  - Phone number: (925) 726-7440
  - Email Address: [sgoulart1321@sdsu.edu](mailto:sgoulart1321@sdsu.edu)

**Sponsor Technical Advisors Contact Names and Technical Disciplines**

- Georgie Rauls
  - Phone number: Unavailable
  - Email Address: [grauls2635@sdsu.edu](mailto:grauls2635@sdsu.edu)
  - Technical Discipline: Ergonomics
- Charlie Webb
  - Phone number: Unavailable
  - Email Address: [cwebb7395@sdsu.edu](mailto:cwebb7395@sdsu.edu)
  - Technical Discipline: Unavailable

**Project Goal(s)**

- Create a modular ergonomic jig to help AER determine seating position in their formula-style race car.
- Provide a qualitative justification of design choices for FSAE design presentation.

**Project Detailed Description**

- A mechanism that allows the team to fit up parts of the ergonomic system such as the seat, steering wheel and column, and pedal box.
- Mechanism needs to be able to manipulate the position of these components to get an idea of what the team's seating position will look like before the fabrication of major components and to ensure rule compliance.

**Estimated Project Material Budget (covers the 9 months of the project)**

This is the estimated material budget that you as the sponsor will set.

- \$2500

**List the key project requirements and specifications:**

- Shall be designed around current AER chassis and current FSAE EV rulebook
- Shall be able to locate following components with the ability to adjust their position
  - Steering wheel
  - Steering column/rack
  - Seat
  - Headrest
  - Pedal box
  - Harness Attachments
  - Dash
- Must be a modular design that can integrate possible future designs of the team
- Shall be able to test for rules compliance
- Shall be able to mount current seat
- Shall be able to mount future seat design
- Shall be rigid enough to ensure accuracy of component locations over time
- Shall be collapsible and able to be stored in a 57-gallon storage bin
- Shall be able to accommodate 5th percentile female (4'11", 113 lbs) to 95th percentile male (6'2", 246 lbs)

**List the key end of project deliverables:**

- Final report must include driver body angles and how they compare with industry standards
- Physical jig and final report must be completed by 2025 Senior Design Day

**List any key sponsor (or competition) provided milestone dates:**

- No milestone dates during the year, jig intended to be used for the 2025-2026 car.

**List any project assumptions:**

- No assumptions, N/A.

**Project Operations**

- Student Team meeting frequency, location and mode
  - Weekly, Tuesdays 2:30 PM - 3:30 PM, Love Library if in person, otherwise Zoom.
- Sponsor meeting frequency, location and mode
  - BiWeekly, AER workshop, in person, dates and times flexible.
- Project work locations
  - AER workshop, EIS-106B, machine shop
- Project related travel
  - No project-related travel.

**Project Technical Scope Questions**

- Key skills that you foresee as being required to complete the project.
  - CAD skills with translation to real-world (SolidWorks)
  - TIG Welding
- General design topics involved with your project:
  - Software involved, language, purpose
    - SolidWorks
  - Commercial software applications that are planned to be used
    - SolidWorks, Ansys
  - Electronic subsystems/components that maybe created/used or acquired
    - N/A
  - List and describe any sponsor furnished equipment, components
    - Old ergo jig
  - List any required interfaces to an existing system (for your design solution)
    - N/A
  - Describe any motion control required
    - Be able to loosen or tighten up
  - Describe any robotics required
    - N/A
  - Describe any advanced manufacturing methods required
    - 3D printing
  - Describe any advanced materials and/or processes needed
    - 3D CNC machine, milling
  - Describe any advanced technology topics such as autonomy
    - N/A
  - List and discuss any special testing such as environmental testing
    - Testing to abide by FSAE rulebook guidelines
      - Rollover testing, driver jump-out testing
  - Describe any special equipment needed to complete the project
    - Welding equipment, old ergo jig