EMPOWER
Cal Poly Student Association

EMPOWER SA
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Spring 2026 Quarterly Design Project: Rain Protection Attachment for John

Context:

John Lee is the Assistive Technology Specialist for the Disability Resource Center (DRC) at Cal Poly. John is also a wheelchair user who is independent, which means he typically does not require assistance throughout his everyday activities. John is in need of a portable attachment to prevent his body and wheel rims from getting wet when it is raining. Current solutions are insufficient for several reasons:

- They do not prevent the wheel rims from getting slippery, which can become a safety hazard when pushing the wheelchair forward.
- They are not made to be attached by an independent wheelchair user since previous designers assumed the user would have assistance.
- They are not portable from a vehicle and are usually made to be attached indoors; they are already deployed so they can't fit out of the car door.

Problem Statement:

Design a device that can be attached to a wheelchair by an independent wheelchair user to protect the user, their belongings, and their wheelchair from rain to ensure autonomy, comfort, and safety.

Guidelines:

The first deliverable for the QDP (**Week 5**) will be to present a proposal to your advisor(s) which will involve plans for designing your inclusive/adaptable device. Following the presentation, teams should finalize their design and begin prototype construction. By the end of the quarter (**Week 9**) teams will present their prototypes and

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final designs and one team will be selected to continue their design as an FDP in the fall. Information on the pitch presentation to come later in the quarter.

Teams are welcome to take design inspiration from current solutions. This quarter, **teams are required to have a physical, manufactured prototype by final presentations in Week 9**. Please refer to machine shop and TECHE resources.

Criterion:
Your design will be assessed based on the following criteria:

- **Compatibility**: Must be compatible with John's wheelchair model (Quickie GP Swing-Away Wheelchair Frame with NaviOne Assistance system)
- **Rain Protection:** Must protect full body, push rims, and additional wheelchair accessories
- **Usable**: Must allow unimpeded, independent use of the wheelchair. Single-person deployment by wheelchair user
- **Portable:** Needs to fit in/out of back-sliding door (31" x 54") OR must deploy as soon as he has exited van
- **Safe:** Must not cause tipping issues with center of gravity shifted towards back (existing battery on back of chair is heavy)
- **Durable:** Resistance to elements (rain, wind, etc.)
- **Comfortable**

*Note: **physical prototypes are required by week 9**, but they can be used in earlier presentations to support your pitch. Small scale 3D printing is also available with approval from the officer board.

Design and Methodology
We recommend your team follow the common engineering design process:
Define the Problem → Research → Proposal → Brainstorm → Choose a solution → Design → Prototype

Resources:
These are some of the resources you have at your disposal for this project:

- **3D Printing:** you may have your parts printed (small scale) by our Ultimaker 3D printers

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    - Send the STL files to techelabtech@gmail.com
    - The Bambu machines have max build volumes of 256mm x 256 mm x 256 mm
    - Printing will be limited this quarter, please ask your advisor if you wish to print
- **Officer Advisor:** each team will have a minimum of one EMPOWER officer assigned to them - they are there to answer any questions and help with your design process--they are not necessarily a member of your team
- **Slack:** for any questions about the process, technicalities, timeline, or anything else about the project, feel more than free to reach out to your fellow members and officers in our slack.
- **Machine Shop:** Aero Hanger and Mustang 60 have extensive manufacturing equipment and training members can take to start manufacturing! Machine shop techs are also great resources for manufacturing advice.
    - Schedule trainings and laser reservations here:

Commitment

You are expected to make your best effort to attend the general meetings, Tuesday's 6pm - 7pm, every week. If you are unable to attend a meeting, we recommend letting your team know!

Good luck and please do not hesitate to ask our officers any questions you may have!