# VR○○○○OM

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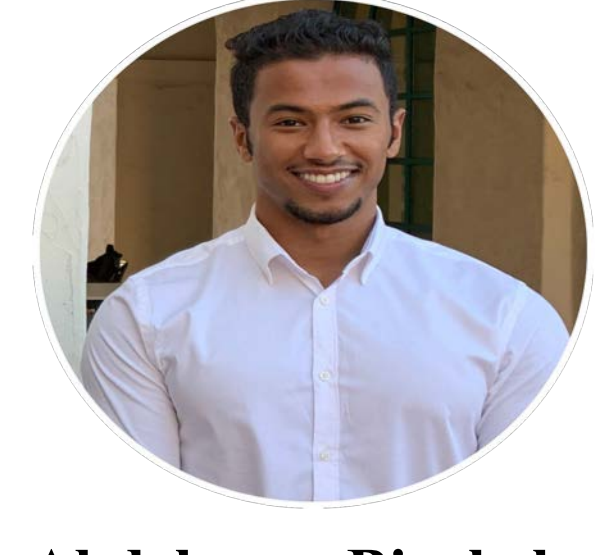
# VIRTUAL REALITY MOTION SIMULATOR

## PROJECT OVERVIEW

**VRoOoOM** is a group of Mechanical Engineering students who are sponsored by the **Themed Entertainment Association** (TEA) at SDSU to build a virtual motion simulator that can be used as an amusement ride and as a training device for racers.
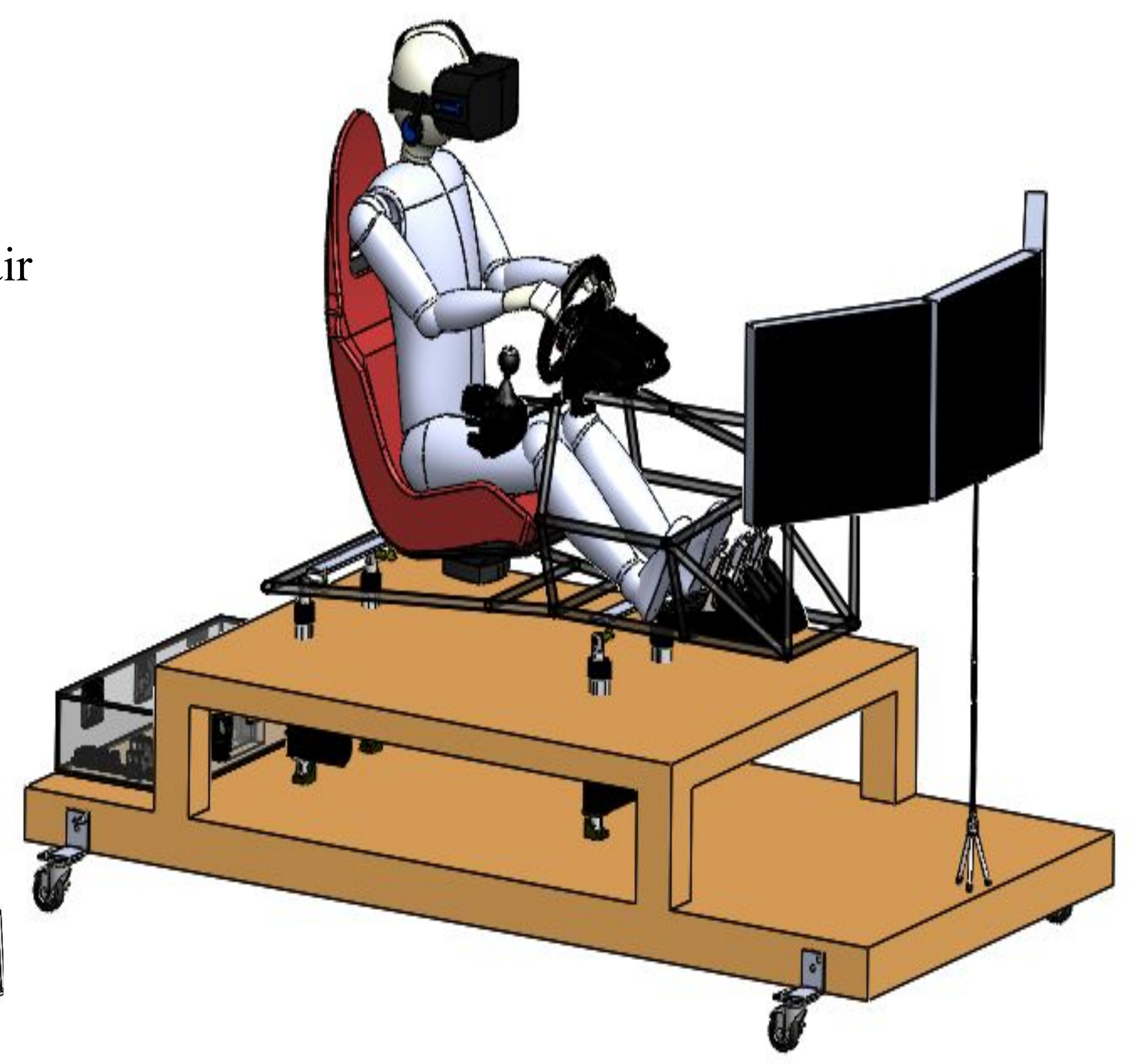
**Need statement**: A realistic feeling motion-simulated driver's chair with integrated motion correlated to the "experience" the gamer is playing using a computer with a virtual reality (VR) headset.
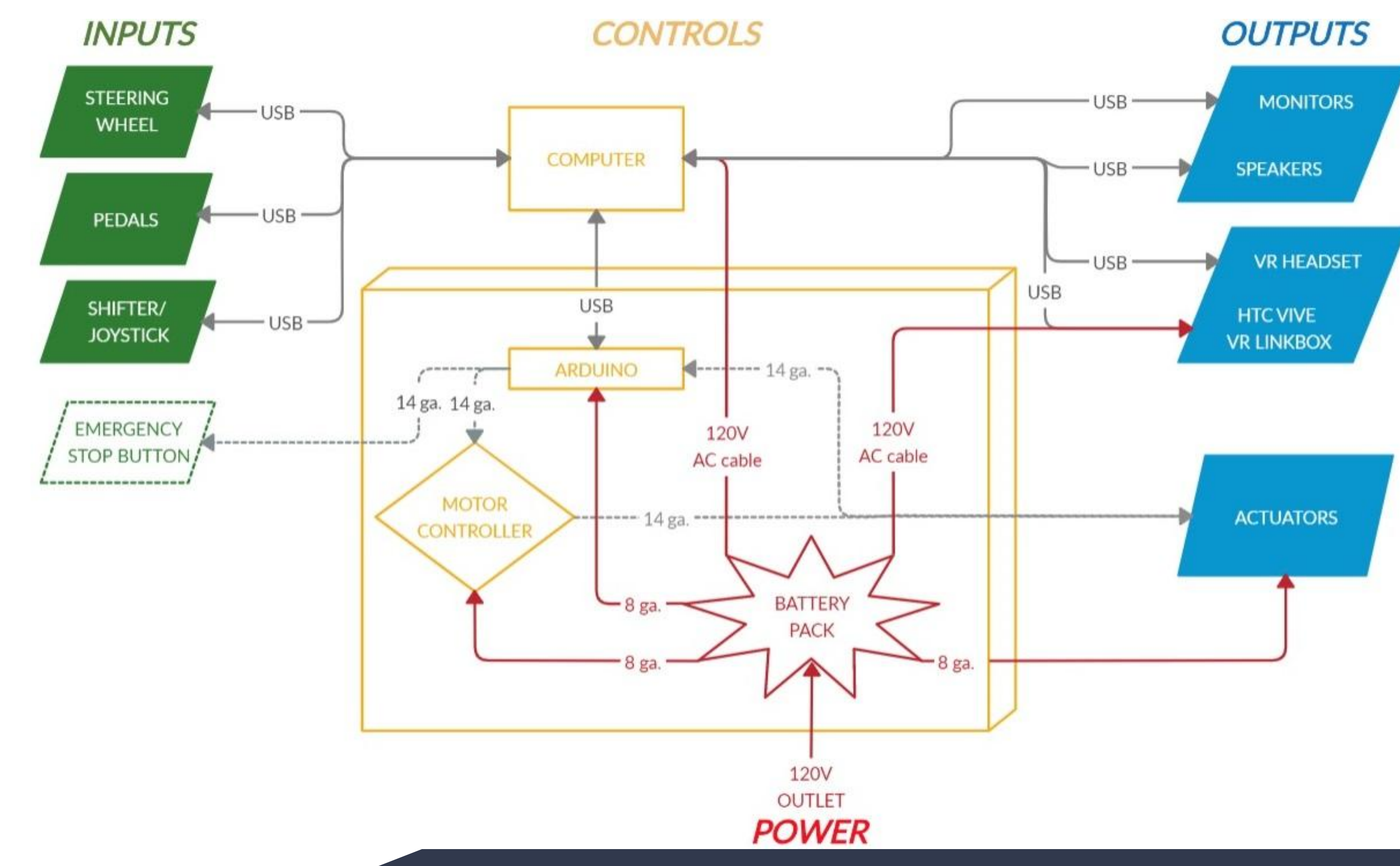
## DESIGN REQUIREMENTS

- Realistic Simulation
- Mobile Base
- Emergency Stop
- Adjustable seat
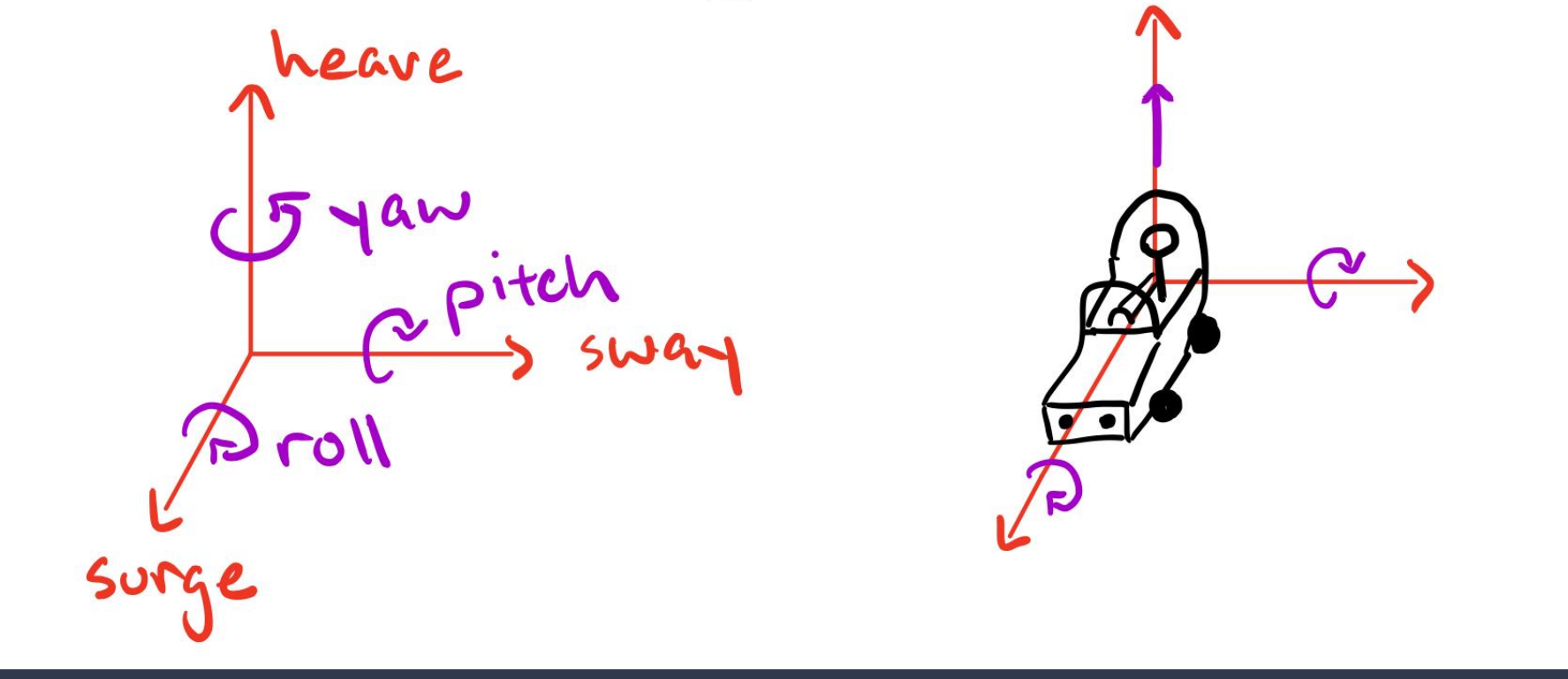- Aesthetic look
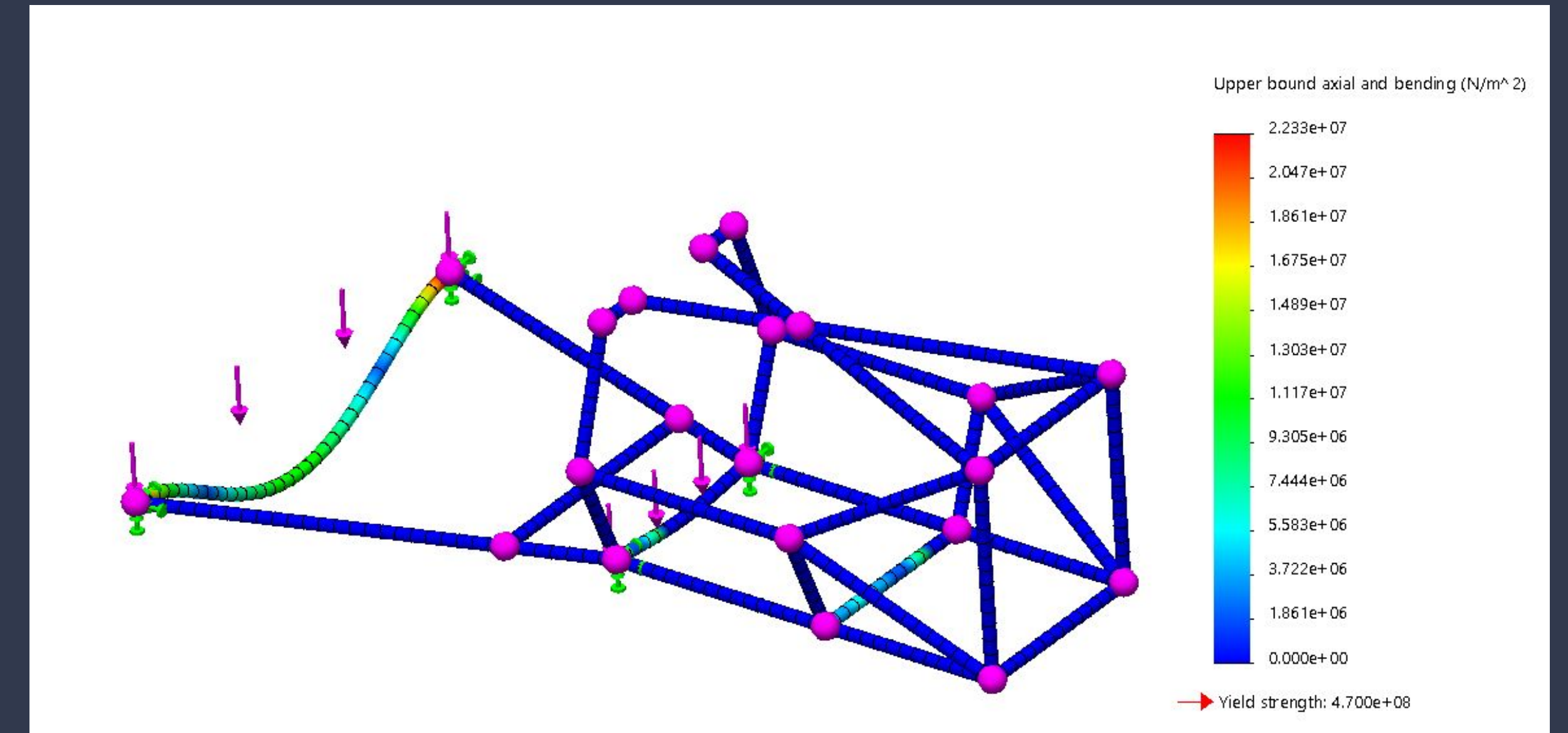- Make use of pre-purchased parts
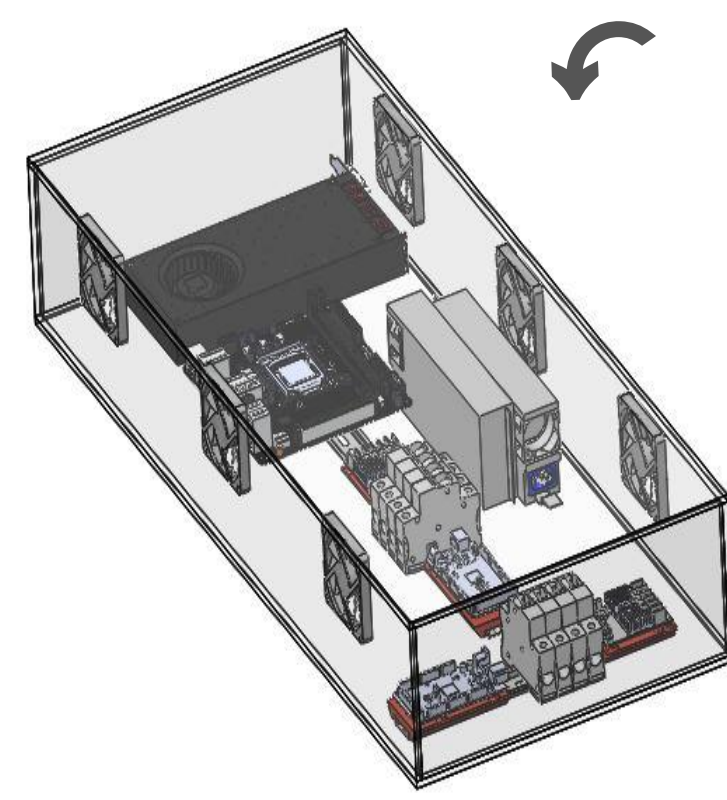
## FABRICATION

Initial Set-up

Water-jetted Control Box

Dual-Level Base

Final Assembly

## SOLIDWORKS MODEL

3 DOF movement system

*heave, yaw, pitch, sway, roll, surge*

## SYSTEM LEVEL DIAGRAM

INPUTS — CONTROLS — OUTPUTS

STEERING WHEEL — USB — COMPUTER — USB — MONITORS
PEDALS — USB — USB — SPEAKERS
SHIFTER/JOYSTICK — USB — ARDUINO — USB — VR HEADSET
EMERGENCY STOP BUTTON — HTC VIVE VR LINKBOX
MOTOR CONTROLLER — ACTUATORS
BATTERY PACK
120V AC cable — 120V AC cable
14 ga. — 8 ga.
120V OUTLET
**POWER**

## ANALYSIS

Upper bound axial and bending (N/m^2)
2.233e+07
2.047e+07
1.861e+07
1.675e+07
1.489e+07
1.303e+07
1.117e+07
9.305e+06
7.444e+06
5.583e+06
3.722e+06
1.861e+06
0.000e+00
Yield strength: 4.700e+08

Structural Factor of Safety (FOS): 21
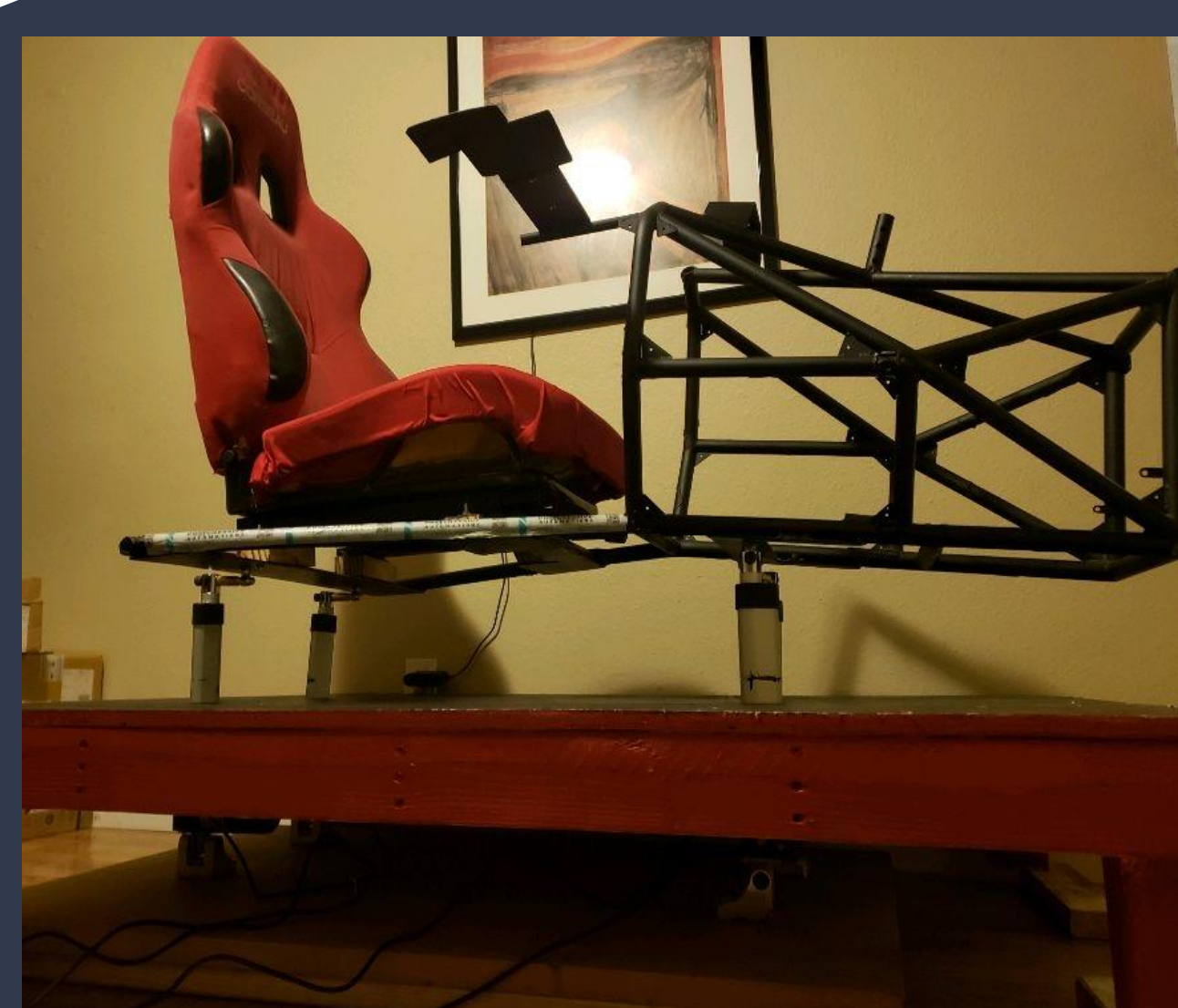
## MAIN COMPONENTS

- Arduino MEGA
- PA-04 Linear Actuator (8", 100lbs)
- Sabertooth 2x30a Motor Control
- LRS-350-12 (12v, 29A Power)
- Logitech G29 Racing Set
- HTC Vive VR set
- X-Simulator

## DEVICE DIMENSIONS

- **Chassis:** 31" x 54"
- **Base:** 48" x 96"
- **Cost:** ~$5,5550

**SAN DIEGO STATE UNIVERSITY**

**Spring 2020**