**Background**
- Society of Automotive Engineers competition team
- Design a prototype off-road racing vehicle with the goal of full product development
- CU has been a competition team since 2015-2016
- Second 4WD vehicle designed by CU

**Design Goals**
- Reduce vehicle weight: 580 lbs → 530 lbs
- Reduce turning radius: 130 in → 80 in
- Increase top speed: 17 mph → 22 mph
- Suspension travel: 11 in
- Static ride height: 9 in
- Increase drivetrain reliability

**Chassis**
- Chassis length reduced by 11 in to reduce weight
- Wheelbase reduced by 5 in to reduce turning radius

**Drivetrain**
- Custom 3:1 Transfer Case
  - Fully assembled transfer case
  - Custom shafts, gear, and bearing arrangement to minimize volume
  - Lightweight aluminum panels help reduce drivetrain weight by 12 lbs

- Custom 4 Wheel Drive System
  - CVTech CVT transmission to maximize engine speed
  - Mounting engine above transfer case reduces length
  - Custom 3:1 transfer case to optimize top speed and torque

**Suspension**
- Trailing arm → A-Arm rear suspension design reduces weight by 7 lbs. and allows for improved packaging in shorter rear end

**Testing Results**
- Vehicle Weight: 503 lbs (without body panels)
- Front Suspension travel: 11 in
- Rear Suspension travel: 9.5 in
- Static Ride Height: 9.5 in
- Top Speed: 19 mph

**Controls**
- Ackerman: inside wheel turns tighter (39˚ max) than outside wheel (37˚ max); decreases tire scrub: beneficial for low HP engine
- Lock all four wheels under braking
- Reduced packaging size to remove 4 chassis members
- Subsystem weight decreased by 4 lbs (8% reduction)