

# 2018 FORMULA SAE LINCOLN/ELECTRIC

## EVENT GUIDE

2017 1st Place IC Class Overall  
Texas A&M - College Station



**FORMULA SAE  
LINCOLN/ELECTRIC**

#FSAELINCOLN

# FORMULA SAE LINCOLN / ELECTRIC

## 2018 SAE INTERNATIONAL PRESIDENT'S MESSAGE



Dear Formula SAE Participants and Organizers:

Formula SAE is steeped in tradition and competition. Now in its 38th year, Formula SAE provides the real-world challenges of systems engineering, design and problem solving, along with the teaming challenges of collaboration and cooperation.

The Formula Electric competition, in its seventh year, offers a unique set of skills and learning opportunities related to the burgeoning electric powertrain technologies.

In short, Formula SAE competitions, along with all of the SAE Collegiate Design Series™ competitions, provide the skills and experiences needed for a well-rounded engineering education.

In addition to learning, Formula SAE also provides a unique form of competition. This week, collegiate engineering students from many different nations will compete in a series of static and dynamic events designed to challenge their engineering, problem-solving and teamwork skills. The students will work hard and compete to win. Some will win first place, others will not. But all will leave here winners because they will be better engineering students.

Good luck to everyone competing this week. The experiences you gain will last throughout your lives. Also, I want to thank everyone for their hard work, support and participation; it's because of you these competitions are such a success.

Sincerely,

A handwritten signature in black ink, reading "Mircea Gradu". The signature is fluid and cursive, with a long, sweeping underline.

Mircea Gradu, Ph.D.  
2018 President  
SAE International



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## CONCEPT OF THE COMPETITION

The Formula SAE® Series are competitions that challenge teams of university undergraduate and graduate students to conceive, design, fabricate and compete with a small, formula style, competition vehicle. To give teams the maximum design flexibility and the freedom to express their creativity and imaginations, there are very few restrictions on the overall vehicle design. Teams typically spend eight to twelve months designing, building, testing and preparing their vehicles before a competition. The competitions themselves give teams the chance to demonstrate and prove both their creation and their engineering skills in comparison to teams from other universities around the world. Registered for this event are 110 teams from colleges and universities participating with both internal combustion and electric powertrain. The end result is a great experience for young engineers in a meaningful engineering project as well as the opportunity of working in a dedicated team effort.

For the purpose of this competition, the students are to assume that a manufacturing firm has engaged them to produce a prototype car for evaluation as a production item. The intended sales market is the nonprofessional weekend competitor. Therefore, the car must have very high performance in terms of its acceleration, braking, and handling qualities. The car must be low in cost, easy to maintain, and reliable. In addition, the car's marketability is enhanced by other factors such as aesthetics, comfort and use of common parts. The manufacturing firm is planning to produce four (4) cars per day for a limited production run. The challenge to the design team is to design and fabricate a prototype car that best meets these goals and intents. Each design will be compared and judged with other competing designs to determine the best overall car.

Over the course of four days, the cars are judged in a series of static and dynamic events including: technical inspection, cost, presentation, engineering design, solo performance trials, and high performance track endurance. These events are scored to determine how well the car performs. In each event, the manufacturing firm has specified minimum acceptable performance levels that are reflected in the scoring equations.

### STATIC EVENTS:

**Design:** The students explain their constructive solutions to a jury of experts from the automotive and motorsport industries in report and discussion. The concept of the design is to evaluate the engineering effort that went into the design of the car and how the engineering meets the intent of the market. The car that illustrates the best use of engineering to meet the design goals and the best understanding of the design by the team members will win the design event.

**Cost:** The students are to assume that a serial production of 1000 cars a year will follow the prototype. The cost calculation is discussed with a jury based on a report. The objective of the event is for the participants to learn and understand the manufacturing techniques and processes of some of the components that they have chosen to purchase rather than fabricate themselves.

**Presentation:** The objective is to evaluate the team's ability to develop and deliver a comprehensive business case that will convince the executives of a fictional manufacturing firm that the team's design best meets the demands of the amateur weekend competition market and that it can be profitably manufactured and marketed.

DYNAMIC EVENTS:

**Acceleration:** The cars are evaluated on their accelerating abilities from a standing start over a distance of 75 meters.

**Autocross:** The objective is to evaluate the car’s maneuverability and handling qualities on a tight course without the hindrance of competing cars. The course will combine the performance features of acceleration, braking and cornering into one event. The results of the Autocross scores determine the starting order for endurance.

**Skid-Pad:** The objective is to measure the car’s cornering ability on a flat surface while making a constant-radius turn. The course will be a pair of concentric circles in shape of the number 8; the cars demonstrate how good lateral forces can be absorbed (up to 1.4g).

**Endurance:** Over a distance of 22 km, the cars have to prove their durability under long-term conditions. Acceleration, speed, handling, dynamics, fuel efficiency, reliability – the cars have to prove it all.

THE FOLLOWING POINTS ARE POSSIBLE:		
Static Events (Thursday)	75	Presentation
	150	Design
	100	Cost Analysis
Dynamic Events (Friday & Saturday)	100	Acceleration
	75	Skid-Pad
	125	Autocross
	100	Fuel Efficiency
	275	Endurance
TOTAL POINTS	1000	

# 2018 FORMULA SAE® LINCOLN

## SCHEDULE OF EVENTS

### TUESDAY, JUNE 19 3 – 5 p.m.

Continued site set up  
**STUDENT TEAM REGISTRATION and PADDOCK**

Lincoln Airpark

### WEDNESDAY, JUNE 20

TBD  
11 a.m.  
11:30 a.m.  
5 p.m.

Gear check opens  
Welcome Ceremony  
*Tech Inspector Volunteer Review Session*  
**Drivers Meeting – Fuel, Tilt, Noise, Brake and Practice – MANDATORY**  
Official Closing of the Site  
EVERYONE MUST BE OFF SITE

**Location**  
Danley Bldg  
Main Tent  
*Danley Bldg*  
**Main Tent**

### THURSDAY, JUNE 22 (all times preceded by “~” are approximate)

7:30 a.m.  
8 a.m.  
8 a.m. – 6 p.m.  
8:30 a.m.  
9 a.m. – 5 p.m.  
9 a.m. – 5 p.m.  
Noon – 1 p.m.  
2 p.m.  
5:30 p.m.  
6:30 p.m.  
7:30 p.m.  
8 p.m.  
~10 p.m.

*Judges Meetings for Design*  
*Judges Meetings for Cost*  
Design Judging – 1st Round Open  
*Judges Meeting for Presentation*  
Cost Event Open  
Presentation Event Open  
Lunch Break  
Dynamic Event Courses Open for Driver Walks  
**Drivers Meeting - All Dynamic Events – MANDATORY**  
*Design Judges Meeting - Judges only*  
Official Closing of the Site  
EVERYONE MUST BE OFF-SITE  
Design Finalist announced online  
(sae.org and fsaeonline.com mobile scoring)

**Location**  
*Danley Bldg*  
*Cost Tent*  
Danley Bldg  
*Arnold Elementary School*  
Main Tent  
Arnold Elementary School  
**Main Tent**  
*Offsite*

### FRIDAY, JUNE 23 (all times preceded by “~” are approximate)

7:30 am  
8 a.m. – 11:30 a.m.  
9 a.m. – 4:30 pm  
9:30 a.m. – 10:30 a.m.  
11:45 a.m. – 12:45 p.m.  
1 p.m.  
1:30 pm – 4:30 p.m.  
5 p.m. – 7:30 p.m.  
7:30 p.m.  
8 p.m.

*Course Crew Briefing - Acceleration and Skid Pad*  
*\*\*EV safety Briefing for Dynamic Volunteers*  
Skid Pad Event and Acceleration Events Open  
Design Feedback for Non-finalists by appointment  
Presentation Feedback Seminar and Q&A  
Lunch Break  
*Course Crew Briefing – Autocross*  
*\*\*EV safety Briefing for Dynamic Volunteers*  
Autocross Event Open  
Design Finals  
Official Closing of the Site  
EVERYONE MUST BE OFF-SITE

**Location**  
*Event Courses*  
Track  
Paddocks  
Main Tent  
Main Tent  
*Track*  
Track  
Danley Bldg

### SATURDAY, JUNE 24 (all times preceded by “~” are approximate)

8:00 a.m.  
~9 a.m.  
8:30 a.m. – ~ 4 p.m.  
9 a.m. – 4 p.m.  
~Noon – 1 p.m.  
~4:30 p.m.  
~5:45 p.m.  
7 p.m.  
8:30 p.m.  
9 p.m.

*Endurance Course Crew Briefing*  
*\*\*EV safety Briefing for Dynamic Volunteers*  
Top 3 Teams Design Finalists Announced  
Endurance/Fuel Economy Event Open  
Design Feedback by appointment  
Lunch Break  
Presentation Highlights  
Design Review of Top IC/EV Teams  
Awards Ceremony  
Official Closing of the Site  
EVERYONE MUST BE OFF-SITE  
All Teams and Transporters Must Exit

**Location**  
*Track*  
Track  
Paddocks  
Main Tent  
Main Tent  
Main Tent  
Main Tent

### SUNDAY, JUNE 25

9 a.m. – 2 p.m.

Site Open ONLY for Pick-Up of Transporters

## DAILY OPERATIONS:

### ■ Lincoln Airpark Site Open:

- Wednesday 9 a.m. – 7:30 p.m.
- Thursday – Saturday 7:30 a.m. – 7:30 p.m.

### ■ Student Registration (Tent):

- Wednesday 9 a.m. – 4:30 p.m.
- Thursday 8 a.m. – Noon

*Fri. & Sat. All students will be registered as spectators*

### ■ Volunteer Registration & Info (Tent):

- Wednesday 8 a.m. – 5 p.m.
- Thursday – Saturday 7:15 a.m. – 4:30 p.m.

### ■ Tech Inspection (Danley Bldg):

- Wednesday 1 – 7 p.m.  
(no new cars after 6 p.m.)
- Thursday 8 a.m. – 5 p.m.
- Friday By appointment until 2 p.m.

### ■ Scales (Danley Bldg):

- Wednesday 3 – 7 p.m.
- Thursday 8 a.m. – 5 p.m.

### ■ Tilt/Noise/Brake:

- Thursday 8:30 a.m. – 5 p.m.
- Friday 8:30 a.m. – 5 p.m.  
(after 2 p.m. by appt only)

### ■ Fuel Station

- Thursday – Friday 8:30 a.m. – 4 p.m.
- Saturday 7:30 a.m. – 4 p.m.

### ■ Practice Area:

- Thursday Noon – 5 p.m.
- Friday 8 a.m. – 5 p.m.
- Saturday 7:30 a.m. – 3 p.m.

*NOTE: Cars must complete all parts of tech by 5 p.m. Friday to qualify for Endurance.*

*30 minutes' notice is required for all appointments, which can be booked through the announcer in Main Tent.*

# 2018 FORMULA SAE® LINCOLN

## SCHEDULE OF EVENTS

### NOTES

- Drivers Meeting – There will be only one drivers meeting covering all dynamic events at 5:30 p.m. Thursday. There will be brief drivers meeting for Fuel, Tilt, Noise, Brake and Practice Areas on Wednesday evening 5 p.m. Drivers are required to attend driver's meetings. Failure to attend driver's meetings may result in the revocation of your driving privileges.
- Event Closing Time – Acceleration, Skid Pad and Autocross close exactly at the scheduled time. **Your car must have crossed the starting line before the event closing time in order to be allowed to complete that run.**
- Course Walks – Autocross and Endurance will be available to walk starting Thursday @ 2 p.m. and will be accessible up to the start of the event. Drivers are **required** to walk the course for each event in which they will be behind the wheel. Course walks will not be scheduled for individual events.
- Removing Vehicles – Vehicles may be taken off site at the individual team's discretion provided Part 1 of the Inspection Sticker has been removed by Tech Chief.
- EMS will provide any/all medical attention.
- All teams not shipping cars must remove their vehicles, etc. from the site no later than 2 p.m. Sunday, June 24, 2018
- Teams shipping cars must have them picked up and removed from the site by 10 a.m. Monday, June 25, 2018 \*\*especially if forklift services are required.
- Announcements can be heard via FM radio (Frequencies will be posted in the Reg. /Info. Tent).

### SUPPORT SERVICES

- **Lincoln Electric Welding Services**
  - Wed. 1:30 – 5 p.m.
  - Th. - Fri. 9 a.m. – 5 p.m.
  - Sat. 9 a.m. – Noon
- **Hoosier**
  - Wed. 1:30 – 5 p.m.
  - Th. - Fri. 9 a.m. – 5 p.m.
  - Sat. 9 a.m. – Noon
- **Food Vendors - See map for location\***
  - All days ~8 a.m. – 5 p.m.
  - \* As business dictates. May close earlier if deemed appropriate.*
- **Information (Main Tent/Danley Bldg):**
  - Th. – Sat. 7:30 a.m. – 6 p.m.
- **Lincoln Airpark Fire trucks on site:**
  - Wed. – Sat. 7 a.m. – ~8 p.m.
- **Ambulance on site**
  - Wed. – Sat. 7 a.m. – ~8 p.m.



# 2018 FSAE LINCOLN **AWARDS**

## **SPIRIT OF EXCELLENCE AWARD**

This award recognizes the Top 10 finishers with overall highest accumulative scores in combustion class and Top 5 finishers with overall highest accumulative scores in Electric Class.

## **STATIC EVENTS**

### **COST AWARD**

This award recognizes the top three finishers in both Combustion and Electric classes with overall highest accumulative scores in Cost.

### **ENGINEERING DESIGN AWARD**

This award recognizes the top three finishers in both Combustion and Electric classes with overall highest accumulative scores in Design.

### **PRESENTATION AWARD**

This award recognizes the top three finishers in both Combustion and Electric classes with overall highest accumulative scores in Presentation.

## **DYNAMIC EVENTS**

### **ROUSH ACCELERATION AWARD**

This award recognizes the top three finishers in both Combustion and Electric classes with fastest speeds/highest accumulative scores in Acceleration. \$1000, \$750, \$500

### **MAGNA AUTOCROSS AWARD**

This award recognizes the top three finishers in both Combustion and Electric classes with fastest speeds/highest accumulative scores in Autocross. \$1000, \$750, \$500

### **ENDURANCE AWARD**

This award recognizes the top three finishers in both Combustion and Electric classes with fastest speeds/highest accumulative scores in Endurance.

### **FUEL EFFICIENCY AWARD**

This award recognizes the top three finishers in both Combustion and Electric classes who receive highest scores accumulated on best fuel efficiency.

### **COOPER TIRE SKID PAD AWARD**

This award recognizes top three finishers in both Combustion and Electric classes with fastest speeds/highest accumulative scores in Skid Pad. Monetary award applicable to Combustion class only: \$1000, \$750, \$500

## **SPECIALTY AWARDS**

(These are specially created sponsored awards; some may require application process.)

### **THREE VIEW DRAWING EXCELLENCE AWARD**

Awarded to a combination of the top 10 Formula SAE teams who submit the best executed three view drawings, per the Formula SAE Rule S6.4. (All Design Reports will automatically be considered and reviewed for this award.) Judging Criteria

### **CUMMINS INC. APPLIED TECHNOLOGY AWARD**

“Applied Technology” Award for the team that applies technology the most innovatively. \$1000, \$750, \$500

# 2018 FORMULA SAE LINCOLN

## REGISTERED TEAMS

### BRAZIL

111 CEFET-MG

### CANADA

014 University of Calgary  
037 University of British Columbia - Okanagan  
061 University of Alberta  
080 Western University  
086 Polytechnique Montréal  
095 Ecole De Technologie Superieure

### INDIA

053 Chandigarh Engineering College

### JAPAN

055 Honda Technical College Kansai

### MEXICO

034 Instituto Tecnológico de Chihuahua  
038 Universidad Nacional Autónoma de México  
062 Universidad Panamericana Sede Guadalajara

### UNITED STATES

001 Texas A & M University - College Station  
002 Missouri University of Science and Technology  
003 University of Kansas - Lawrence  
004 Iowa State University  
006 University of Illinois - Urbana Champaign  
007 California State University - Northridge  
008 University of Calif - San Diego  
009 California Polytechnic State University-SLO  
011 University of Calif - Irvine  
013 Polytechnic University of Puerto Rico  
015 South Dakota State University  
016 University of Houston - Houston  
017 University of Oklahoma  
018 Saint Louis University  
020 University of South Florida  
021 California Baptist University  
022 Colorado School of Mines  
023 San Diego State University  
024 California State University - Fullerton  
025 California State University - Sacramento  
026 California State University - Los Angeles  
027 University of Kentucky  
028 University of Texas - Arlington  
029 University of North Texas  
030 University of New Mexico  
031 Kennesaw State University  
032 University of North Dakota  
033 University of Illinois - Chicago  
035 University of Texas - Austin  
036 University of Calif - Los Angeles  
039 Florida A&M University/Florida State University  
041 University of Nebraska - Lincoln  
042 Arizona State University - Tempe  
046 University of Calif - Berkeley  
047 University of Calif - Riverside  
048 University of Louisville  
049 Oklahoma State University  
050 Southern Methodist University  
051 Northern Illinois University  
052 University of Colorado - Denver  
054 University of Hawaii - Manoa  
057 Hope College  
058 University of Arizona  
063 University of Delaware  
064 University of Southern California  
065 California State University - Chico  
066 University of Wisconsin - Platteville  
067 University of Massachusetts - Lowell  
068 Southern Illinois University - Edwardsville  
070 Western Washington University  
071 University of Texas - San Antonio  
072 Texas A&M International University  
073 University of Texas - Dallas  
074 University of South Alabama  
078 North Carolina State University - Raleigh  
079 Auburn University

081 Michigan State University  
083 Kettering University  
084 Rose Hulman Institute of Technology  
085 Louisiana State University  
087 University of Toledo  
088 University of North Florida  
089 University of Maryland - College Park  
090 San Jose State University  
091 Northwestern University  
092 University of Cincinnati  
094 University of Alabama - Tuscaloosa  
096 University of Minnesota - Twin Cities

# 2018 FORMULA SAE ELECTRIC

## REGISTERED TEAMS

### BRAZIL

E203 Universidade Estadual de  
Campinas

### CANADA

E218 University of Waterloo

E222 University of Ontario Institute  
of Tech

E230 Montreal Polytechnique

E232 University of Manitoba

### SOUTH KOREA

E214 Kookmin University

### UNITED STATES

E201 University of Pennsylvania

E202 Massachusetts Institute of  
Technology

E204 Missouri University of Science  
and Technology

E205 University of Washington

E206 University of Calif - Davis

E207 Virginia Tech

E208 University of Wisconsin -  
Madison

E209 California Polytechnic State  
University-SLO

E210 University of Kansas - Lawrence

E212 Auburn University

E213 University of Calif - Irvine

E215 University of Akron

E216 Florida Institute of Technology

E217 Georgia Institute of Technology

E219 University of Texas - Austin

E220 University of Illinois - Urbana  
Champaign

E221 University of Calif - Santa Cruz

E223 Carnegie Mellon University

E224 San Diego State University

E225 Purdue University - W Lafayette

E228 University of Utah

E229 California Institute of Technology

E231 University of Texas - San Antonio

E233 San Jose State University



## Texas A & M University - College Station

### Texas A&M University



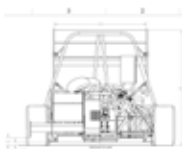
We are not the Texas A&M team that won last year.

Enjoying a 100% design team turnover as a senior capstone project, our 22-person squad began our design process last September. The 2017 team's performance set an impressive example to follow...so we pushed it all aside and started afresh (of course). We prioritized safety and practicality first, then driver and tuner-accessible performance.

Practical concerns of safety, rules compliance, manufacturability, and reliability inspired emphasis on design for in-house manufacturing, efficient maintenance, and much track testing. This has fostered versatility in our team, not just our car, which will be important in the Design Event.

Our approach to performance was born from lap simulations and prior FSAEL track data, highlighting low weight and transient handling. Aggressive reductions in polar moment of inertia aided these by placing a lightweight, single-cylinder engine alongside the driver. This unconventional vehicle layout also increased control of rear weight bias: a parameter we consider vital in Dynamic Events.

So, about that #1? Those before us earned it, but as the Texan rebels at Gonzales said: "Come and take it".



**BRAKE** : Front: dual outboard drilled rotors; Rear: single inboard drilled rotor

**BSCD** : 102 mm / 84.5 mm / 1 Cylinder / 690 cc

**COOLING** : Yamaha FZ1 radiator, 844 CFM 11" Spal fan (pull)

**DRIVE** : 520 chain drive, Drexler clutch type limited slip differential

**ELECTRONICS** : MoTeC M150 ECU and datalogger, AiM Formula wheel, multiple sensors

**ENGINE** : 2014 KTM 690

**FR/RR TRACK** : 51.5 in (1308mm)/ 49.5 in (1257 mm)

**FRAME** : 4130 Chromoly Steel

**FUEL SYSTEM** : Carbon fiber fuel tank, electronic fuel injection

**FUEL TYPE** : E85

**MATERIAL** : Aluminum/Carbon Fiber/Fiberglass/Steel/Dacron

**OLWH** : 116.4 in (2,957 mm), 59.4 in (1,509 mm), 46 in (1,168 mm)

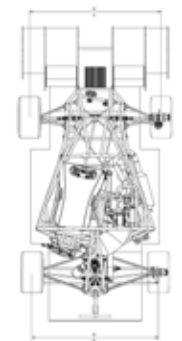
**SUSPENSION** : SLA, push rod actuated rockers

**TIRE** : 16 X 7.5-10 LCO

**UNIQUE** : Side-mounted engine

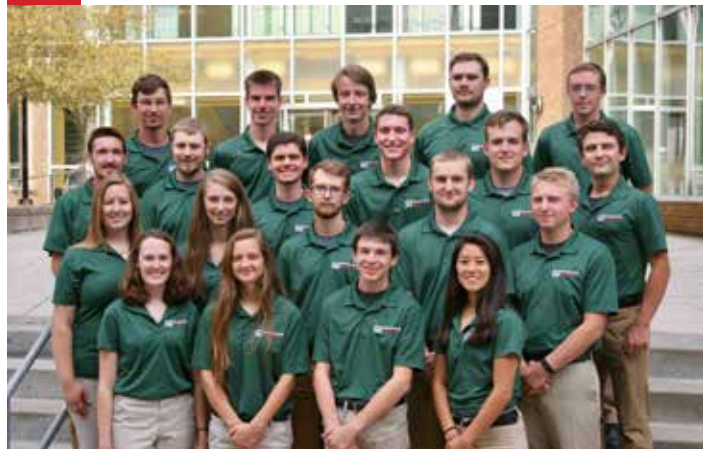
**WEIGHT** : 570 lb

**WHEELBASE** : 60.5 in (1536 mm)

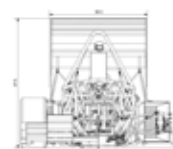


## Missouri University of Science and Tech

### Missouri S&T FSAE



S&T Racing is continuing the tradition of a high downforce aero package, high horse power platform. The aggressive semi-unsprung aero package integrated with the un-equal length double A-arm suspension is powered by a 4 cylinder Kawasaki ZX-6R that allows for higher cornering speeds. S&T Racing would like to thank our family, friends, and sponsors for supporting us throughout the year.



**BRAKE** : Front ISR 4 Piston Monobloc, Rear 2 Piston Monobloc

**BSCD** : 47mm/42.5mm/4/60cc

**COOLING** : Dual Single Pass Radiators

**DRIVE** : Chain Drive

**ELECTRONICS** : Battery: Braille G9L, AiM Evo4, MoTeC M150

**ENGINE** : 2012 Kawasaki ZX-6R

**FR/RR TRACK** : 48in/47in

**FRAME** : Tubular Space Frame

**FUEL SYSTEM** : Custom

**FUEL TYPE** : 100 Octane

**MATERIAL** : 4130 Chromoly Steel

**OLWH** : 119in/57in/42in

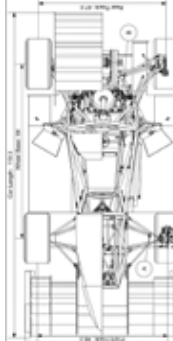
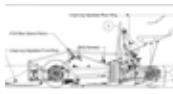
**SUSPENSION** : Unequal Length Double A-Arm

**TIRE** : 18 x 7.5 - 10 Hoosier R25B

**UNIQUE** : Semi-Unsprung Aero

**WEIGHT** : 585

**WHEELBASE** : 64in







# Shaping “What’s Possible” for Mobility

At General Motors, we are leading the transportation revolution. From vehicle electrification to self-driving cars, we’re committed to delivering safer, simpler and more sustainable solutions for our customers around the world. Bring your talents to GM and tackle the industry’s most significant challenges, with all the resources you need to unlock tomorrow’s breakthroughs.

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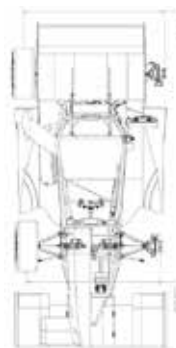
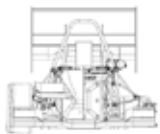


2019 Corvette Z06





CR-23 is Iowa State University's 23rd car to compete in the Formula SAE series. Cyclone Racing emphasized three goals during the design of CR-23: Replace the obsolete Torsen T1 differential, reduce aerodynamic drag, and minimize weight throughout. The Drexler limited slip differential will take the place of last year's Torsen. Using custom differential mounts, eccentric mounting will allow for easy chain adjustment. The suspension system will continue to use machined aluminum control arms and 7" wide wheels for optimal cornering stiffness and minimal deflection. The aerodynamics of CR-23 have been completely redesigned from previous years, with the introduction of an undertray being the largest change. Each wing element has been designed to complement the underbody downforce and minimize the amount of drag. The powertrain system for CR-23 will feature a Yamaha YFZ450R engine and a high-compression piston. A smaller cooling system aids in the weight reduction goal for this year while still meeting the engine's needs. The cockpit of the car is highlighted by 3D printed paddle shifters. Additionally, the braking system received updates to ensure bias is easily adjusted.



**BRAKE :** Wilwood PS-1 Calipers, Tilton 78 Series Master Cylinders

**BSCD :** 95 mm/63.4 mm/1/449 cc

**COOLING :** Dewitt's-Built Dual-Pass Radiator, SPAL Fan

**DRIVE :** Chain Drive, Drexler Limited Slip Differential

**ELECTRONICS :** Performance Electronics PE3 ECU, AiM Data Logger

**ENGINE :** Yamaha YFZ450R, 14:1 Wiseco Piston

**FR/RR TRACK :** 1194 mm/47 inch, Rear: 1245 mm/49 inch

**FRAME :** TIG Welded 1020 Steel Spaceframe, Black Textured Powder Coat

**FUEL SYSTEM :** Bosch EV14 Injector, Deatschwerks FPR, SLS Printed Fuel and Overflow Tank

**FUEL TYPE :** Car: E85

**MATERIAL :** Valyrian Steel

**OLWH :** Length: 2374 mm/93.5 inch Width: 1405 mm/55.5 inch Height: 1183 mm/46.5 inch

**SUSPENSION :** : Pushrod Actuated Ohlins TTX25 MKII Dampers, NonParallel Unequal Length A-Arm

**TIRE :** 7.0/18.0-10 Hoosier R25

**UNIQUE :** Machined Aluminum A-Arms, Trademarked University Logo, Mustache Wings

**WEIGHT :** 550 lb/250 kg

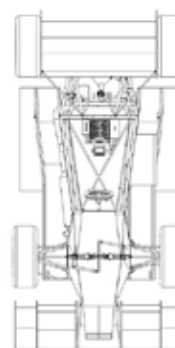
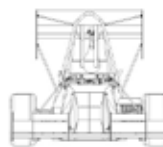
**WHEELBASE :** 1575 mm/62 inch



United States



For the 2018 competition season, the California State University, Northridge Formula SAE team has made many significant changes. There has been three major re-designs. The first is moving away from our 3-rotor brake system and implementing a 4-rotor design. There has been a titanium z-bar front sway bar replacing the old one. And the third is having a brand new CRF 450 R engine. Due to these few changes we had to change packaging and mounting strategies. We are looking forward to the testing and validating phase to see how our vehicle handles.



**BRAKE :** Wilwood Calipers with steel floating rotors

**BSCD :** 96 mm / 62.1 mm/ single cylinder/ 449 cc displacement

**COOLING :** Side mounted 1 core aluminum radiator , 800 cfm fan mounted to shroud

**DRIVE :** Chain Drive

**ELECTRONICS :** Athena GET M40 data logger with built in GPS plug

**ENGINE :** HONDA CRF 450R

**FR/RR TRACK :** 1295 mm (51 in) / 1245 mm (49 in)

**FRAME :** 4130 Chromoly Steel Space Frame

**FUEL SYSTEM :** OEM Honda Internal fuel pump Assembly, RC 370 cc injector

**FUEL TYPE :** 100 Octance

**MATERIAL :** 4130 Steel, 7075 Aluminum, Carbon Fiber, Aircraft Fabric, Titanium

**OLWH :** 2692 mm (106 in) / 1295 (51 in) / 1194 mm (47 in)

**SUSPENSION :** Double Unequal A-Arms Push Rod

**TIRE :** 18.0-10/ 6.0 R25Bs, Hoosier

**UNIQUE :** Quaife, Z-bar Sway Bar,

**WEIGHT :** 480 lbs

**WHEELBASE :** 1562 mm (61.5 in)



United States

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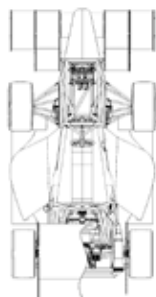
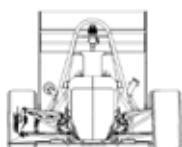


## University of Calif - San Diego

### Triton Racing



Triton Racing's TR-18 builds upon our previous success with TR-16S and features several ameliorations. Our efficient and reliable powertrain, full aerodynamics package, and De Dion type dependent rear suspension are joined by evolutions such as a shorter wheelbase, pull rod front suspension, fortified watts crank and diff mounts, and much more. Comparable weight but more power and ergonomics improvements in a smaller package result in driver comfort and increased performance on winding tracks. With significant validation testing and tuning TR-18 is Triton Racing's most competitive car to date.



**BRAKE :** Wilwood calipers; outboard front, inboard rear  
**BSCD :** 67.0mm/47.5mm/4/670cc  
**COOLING :** Single aluminum radiator with 1 fan  
**DRIVE :** Chain driven Williams differential  
**ELECTRONICS :** OEM ECU with piggyback Powercommander  
**ENGINE :** Yamaha FZ6R  
**FR/RR TRACK :** F: 1270mm/50in, R: 1219mm/48in  
**FRAME :** 4130 Steel Space Frame  
**FUEL SYSTEM :** OEM port injected  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** Large variety  
**OLWH :** L: 3150mm/124in, W: 1511mm/59in, H: 1196mm/47in  
**SUSPENSION :** Front Double Wishbone, Rear de Dion, Pushrod actuated  
**TIRE :** 20.5 x 7.0-13 R25b  
**UNIQUE :** Independent de Dion rear suspension, unsprung aero, Watt's linkage  
**WEIGHT :** 291kg/641lbs  
**WHEELBASE :** 1537mm/60.5in



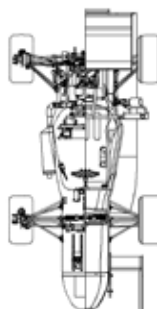
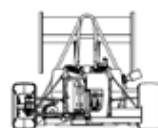
## California Polytechnic State University-SLO

### Cal Poly Racing Combustion



The CP18C iterates on the previous year's CP17C, with a single-cylinder internal combustion engine and composite monocoque chassis. The CP18C, endearingly called "Frankie," demonstrates a general improvement in build quality from the previous year, along with a switch to 10" tires and significant changes to suspension and aero architectures. Particular emphasis was placed on data acquisition, motivating an increase in dynamic testing time, the integration of many new sensors, and extensive static testing of chassis, suspension, and aero components. Test results drove design decisions and helped improve vehicle models for a wide range of purposes, from studying the transient effects of chassis torsional stiffness to driver training on simulated competition tracks, critical to dynamic performance and vehicle understanding.

We'd like to thank all of our partners, private donors, the Cal Poly ME department and shops, and our families and friends for supporting us in this long and sleepless venture. We'd also like to thank our faculty advisor, Fab, for his superb technical advice and tough love.



**BRAKE :** Tilton 78 Series 5/8, 7/10 MCs; Brembo P34, AP Racing CP 4226-2S0 calipers  
**BSCD :** 95 mm / 63.4 mm / single cylinder / 449 cc  
**COOLING :** Side-mounted 8x10" single-pass radiator w/ 22 mm core, 750 cfm SPAL Fan  
**DRIVE :** Chain drive, Drexler limited-slip-differential  
**ELECTRONICS :** MoTeC M400 ECU and ACL, custom CAN-based dash display, custom CAN modules  
**ENGINE :** 2014 YFZ 450R (40 hp @ 9500 RPM, 44 ft-lbs @ 8000 RPM)  
**FR/RR TRACK :** 49.5/48.5"  
**FRAME :** CFRP Monocoque  
**FUEL SYSTEM :** Bosch EV-14 330 cc injector, fuel tank w/ Holley Hydramat anti-sloshing  
**FUEL TYPE :** 100 Octane (and yerba mate)  
**MATERIAL :** Loctite red  
**OLWH :** 114", 59", 46"  
**SUSPENSION :** Double-wishbone with pushrod-actuated springs and Ohlins TTX25 dampers  
**TIRE :** Hoosier R25B 18.0x7.5-10  
**UNIQUE :** 2nd fastest SLO car (see vehicle E209)  
**WEIGHT :** 565 lbs  
**WHEELBASE :** 61"





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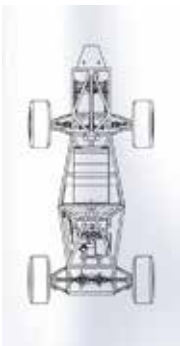
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The 2018 Polytechnic University of Puerto Rico Formula SAE Team is competing as a first year team in Formula SAE Lincoln, Nebraska. The Polytechnic University of Puerto Rico has competed in previous years with different teams and at different events but none with our current team. We focused our efforts mainly on the suspension, chassis, and powertrain of our vehicle to ensure agile and precise handling coupled with powerful progressive acceleration. The manufacturing process was facilitated by using many off-the-shelf parts from various companies instead of one-off custom components that would have increased the time required to build the vehicle.

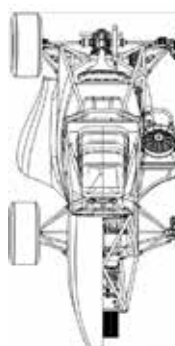
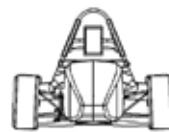


**BRAKE :** Brembo P34/P32 Calipers  
**BSCD :** 67mm/42.5mm/4/599cc  
**COOLING :** Mishimoto Rhino 700 Radiator  
**DRIVE :** Chain Drive  
**ELECTRONICS :** Haltech Elite 2000 ECU  
**ENGINE :** Honda CBR600RR  
**FR/RR TRACK :** 50"/ 49"  
**FRAME :** Steel Spaceframe  
**FUEL SYSTEM :** Electronic Fuel Injection  
**FUEL TYPE :** 100 octane  
**MATERIAL :** 4130 Chromoly  
**OLWH :** 3050mm/1453mm/1168mm  
**SUSPENSION :** Ohlins TTX25 MkII  
**TIRE :** 20.0x7.2-13 Avon A92  
**UNIQUE :** Turbocharged  
**WEIGHT :** 700lb  
**WHEELBASE :** 1752mm



The University of Calgary Formula SAE team is proud to present the next vehicle in our team's legacy. Designs this season were driver focused, from an ergonomics influenced chassis design and custom molded seats to front and rear Pull rod actuated dampers. A Racecapture Pro DAQ influenced suspension tuning, optimizing the R25B compound. Powering the SR-19 is a 600cc Honda F4i backed by a PE3 ECU.

Schulich Racing would like to thank all our sponsors, family and friends for continued support this season, without whom this would not have been possible.



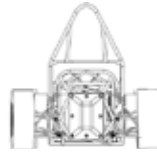
**BRAKE :** Willwood DynaPro, 2 Piston Front Callipers with GP200 Rears, 2 Piston  
**BSCD :** 67/42.5/4/599  
**COOLING :** Side Mounted, Aluminium Radiator w/ Fan  
**DRIVE :** Chain Driven w/ Torsen LSd  
**ELECTRONICS :** PE3 ECU, RaceCapture Pro Datalogger  
**ENGINE :** CBR 600 f4i  
**FR/RR TRACK :** 1250mm/1200mm  
**FRAME :** 4130 Steel Space Frame  
**FUEL SYSTEM :** Honda/Bosch PGM-FI  
**FUEL TYPE :** 93 RON Gasoline  
**MATERIAL :** Steel, Aluminum, Carbon Fibre, Plastics  
**OLWH :** 108/59/42  
**SUSPENSION :** Double Unequal Length Wishbone, Pullrod Actuated Outboard Damper  
**TIRE :** Hoosier R25B 20.5x1-13  
**UNIQUE :** 3D Printed Intake, Custom Wiring Harness  
**WEIGHT :** 635  
**WHEELBASE :** 1596mm







"Ric" will be the third car built by Cougar Racing at the University of Houston. Last year, we were able to better our scores in nearly every category compared to our first car. This year, we want to continue that trend. After reflecting on our second year at competition, we placed an emphasis on developing sound designs that can be used as the basis for future cars. This goal is vital to our organization's growth and improvement as it allows us to spend each year engineering a few components instead of an entire car. Furthermore, in order to become a more established team, we have improved in several aspects of the design process. These include integration, material selection, cost, and decision evaluation based on competition points. With our current progress, we hope to return every year with new improvements and greater achievements.



**BRAKE :** Wilwood GP200 Calipers-Front/Ap Racing CP4226-Rear  
**BSCD :** 95mm/63mm/1 cyl/449cc  
**COOLING :** Dual-Side mounted 4.5" x 10.25" core OEM radiators , 147 cfm fan mounted to radiator shroud  
**DRIVE :** 520 Chain, Single Sprocket  
**ELECTRONICS :** Mega Squirt ECU with extension board and custom harness  
**ENGINE :** KTM 450 SXF  
**FR/RR TRACK :** 1168 mm/1143 mm  
**FRAME :** Tube Space Frame  
**FUEL SYSTEM :** OEM KTM Port Injector  
**FUEL TYPE :** 93 octane  
**MATERIAL :** 1026 DOM Steel  
**OLWH :** 2923 mm/ 1356 mm/ 1112 mm  
**SUSPENSION :** SLA, Pushrod, Coil springs, Torsion antiroll bar  
**TIRE :** 18 x 7.5 - 10 R25b  
**WEIGHT :** 550 lbs  
**WHEELBASE :** 1600 mm



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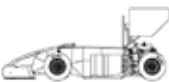
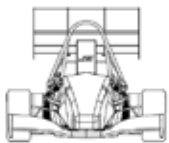




The Sooner Racing Team's 2018 entry to FSAE Lincoln, Stella, is designed around reliability, manufacturability, and low weight.

Reliability and manufacturability were chosen as goals due to the high attrition rate during the endurance race (which accounts for a large percentage of the total available points) as well as the reliability issues that are prevalent among formula SAE vehicles. Through an examination of previous FSAE competitions, it was determined that finishing every dynamic event is the most important aspect of placing well. To ensure that Stella would be both reliable and manufacturable, design preference was placed on iterating from the 2017 car rather than designing an entirely new concept in order to help minimize failure modes associated with drastic change.

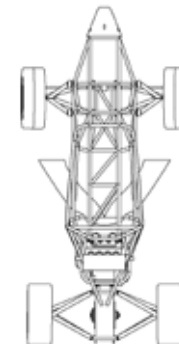
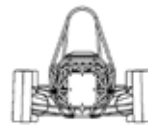
Low weight was chosen as a performance metric to ensure that Stella will be agile, allowing her to compete at a high level. A 10% trade sweep chart was assembled using in-house developed, quasi-steady-state lap time simulation software to examine the relative difference between various design parameters; low weight and cg were shown to be of critical importance.



**BRAKE :** 4 outboard AP Racing calipers, floating rotors  
**BSCD :** 102mm, 84.5mm, 1 cyl, 69 cL disp.  
**COOLING :** 2 Honda XR650 Radiators w/ SPAL fans  
**DRIVE :** Chain driven (428), transmission internal in engine, Drexler LSD  
**ELECTRONICS :** MoTeC M130 ECU, custom relay box  
**ENGINE :** 2015 KTM 690 LC4  
**FR/RR TRACK :** 1156mm / 45.5", 1156mm / 45.5"  
**FRAME :** AISI 4130 Chromoly Steel  
**FUEL SYSTEM :** Return style, internal pump  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** CFRP, Al, Steel, Rubber, Walnut  
**OLWH :** 2794mm / 110", 1308mm / 51.5", 1199mm / 47.2"  
**SUSPENSION :** Nonparallel SLA, rod-actuated coil-over, Öhlins TTX25 MkII dampers  
**TIRE :** Hoosier LC0 6.0/18.0-10  
**UNIQUE :** Soft-mounted engine, heated seat, luxury steering wheel  
**WEIGHT :** 245 kg / 540lb  
**WHEELBASE :** 1588mm / 62.5"



The 2018 Parks Racing team is competing in Formula SAE Lincoln for the second time in the organization's recent history. While the team has produced several different designs in the past, this year's submission serves as an incremental improvement over the most previous design. The team focused on producing a low cost car, focusing on simplistic design without majorly compromising performance. Tooling as well as ease of maintenance were additional design priorities.



**BRAKE :** 4-wheel Wilwood GP200 Calipers, Tilton 76-series master cylinders  
**BSCD :** 67mm/42.5mm/4/599cc  
**COOLING :** Centrally mounted radiator, remotely ducted cooling fans  
**DRIVE :** Chain drive, torsen type differential  
**ELECTRONICS :** Megasquirt MS2 ECU  
**ENGINE :** Honda CBR600F4i  
**FR/RR TRACK :** 54in/54in  
**FRAME :** 4130 tubular space frame  
**FUEL SYSTEM :** Aluminum fuel tank, sequential spark and injection  
**FUEL TYPE :** 93 octane  
**MATERIAL :** Carbon fiber and fiberglass bodywork  
**OLWH :** 120in/54in/45in  
**SUSPENSION :** Double unequal length a-arms, front pullrods, rear pushrods  
**TIRE :** 20.5" Hoosier R35A  
**UNIQUE :** Transaxle style aluminum rear subframe  
**WEIGHT :** 775 lbs  
**WHEELBASE :** 75in







This year's design is a complete overhaul of USF Racing's previous car which had been evolving for the past 4 years. The headlining feature is a switch to the CBR600 engine which required changes to the frame and suspension which lead to changes across the board. With a new mission of ultimate reliability, USF Racing intends to be well prepared for competition with a proven car and team by the time we compete this summer. Come find out more about what we have to offer this year as we travel to 3 major competitions this summer!



**BRAKE :** Tilton, AP Racing  
**BSCD :** 67x42.5mm 599cc  
**COOLING :** Single pass 9x13x1in radiator  
**DRIVE :** Drexler LSD, chain drive  
**ELECTRONICS :** AIM MXS data, Motec M150 ECU  
**ENGINE :** CBR600RR  
**FR/RR TRACK :** 1270mm / 50in F and R  
**FRAME :** 4130 Semi-stressed engine spaceframe  
**FUEL SYSTEM :** Bosch fuel pump  
**FUEL TYPE :** 93 octane gasoline  
**MATERIAL :** Carbon fiber aerodynamics, aircraft fabric body covering  
**OLWH :** 2930x1270x1155mm / 115x50x46in  
**SUSPENSION :** Double A-arm, pushrod actuated  
**TIRE :** Hoosier 18x6in R25B  
**UNIQUE :**  
**WEIGHT :** 600lb  
**WHEELBASE :** 1575mm / 62in



United States

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## California Baptist University CalBaptist Racing



CalBaptist Racing is competing in Formula SAE for the second year of the club's existence. In 2017, the team finished 61st out of 80 teams in its first competition at Lincoln, Nebraska. For the 2018 competition year, an emphasis was placed on reducing the overall weight of the vehicle. Last year's vehicle weight of 776 pounds eclipsed all other vehicles at the competition. As a result, a goal was set for the 2018 vehicle to weigh 510 pounds or less. Other goals for this year included increasing the drivability of the vehicle through a linear power band and proper suspension geometry.



**BRAKE :** F: Kawasaki Rotor, Wilwood Calipers; R: Single Wilwood Rotor  
**BSCD :** 102/84.5/1/690  
**COOLING :** Side mounted 2 core radiator, single pass; 450 cfm fan, electric water pump  
**DRIVE :** Chain, 520  
**ELECTRONICS :** Shorai LFX14A4-BS12 Battery, AEM Infinity 506 ECM  
**ENGINE :** 2016 Husqvarna 601 Enduro  
**FR/RR TRACK :** 1302/51.3, 1302/51.3  
**FRAME :** Spaceframe, 4130 DOM Round Tubing  
**FUEL SYSTEM :** 6.0L Aluminum Fuel Tank, Dual Injector System  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** N/A  
**OLWH :** 2633/103.7, 1493/58.8, 1255/49.4  
**SUSPENSION :** Unequal length double wishbone, Push-rod; Aluminum Uprights  
**TIRE :** 18x7.5-10, R25B Hoosier  
**UNIQUE :** AEM CD-5 Dash with GPS  
**WEIGHT :** 657  
**WHEELBASE :** 1575/62

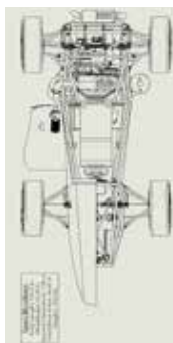
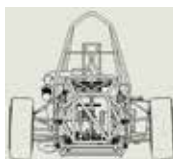


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## Colorado School of Mines Mines Formula



MF6 is a continued iteration of the previous vehicle with changes being focused upon weight reduction and engine accessibility. The engine can now be dropped out without removing any frame tubes and the chassis saw nearly a 30% decrease in weight with a 10% increase in overall stiffness. The pedal box design was a focus upon adjustability to fit a large range of drivers. This was accomplished through increase adjustability in the pedals and a longer overall toe box. The focus upon weight continued with the suspension with every single component seeing a reduction in weight. The team also explored carbon fiber to a more significant extent in the powertrain system, leading to overall weight loss and a stiffer intake.



**BRAKE :** Steel floating rotors  
**BSCD :** 67 mm, 42.5, 4, 599cc  
**COOLING :** Electric water pump with dual core radiator  
**DRIVE :** Chain driven RWD  
**ELECTRONICS :** PE3 EC, with Aim Evo data acquisition  
**ENGINE :** Honda CBR 600RR  
**FR/RR TRACK :** 48 in/ 48 in  
**FRAME :** 4130 steel space frame  
**FUEL SYSTEM :** EFI  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** Purple heart wood  
**OLWH :** 110, in, 55.5 in, 49.25 in  
**SUSPENSION :** Unequal length double A-arm push rod  
**TIRE :** 20.5 x 7 x 13 Hoosier R25B  
**UNIQUE :** Purple heart wood dash  
**WEIGHT :** 650 lb  
**WHEELBASE :** 60.25 in







The Titan Racing Formula vehicle design continues to incorporate a composite driver cell and Yamaha FZ-07 motor for its newest model: The Titan XI. Additions to the vehicle from its previous model include magnesium wheels and an anti-roll bar. The primary objective for our team continues to be drivability, which is reflected in ergonomic features such as an assisted launch system and electronic shifting. The Titan XI includes an adjustable aerodynamic package as well as a data acquisition system, which will serve as a reliable testing apparatus for the development of future models.

We would like to thank all of the sponsors, alumni, friends, and family of Titan Racing who do everything they can to help us cross the finish line!



**BRAKE :** Floating Cast Iron Rotors, Wilwood PS-1 Calipers

**BSCD :** 80 mm/68.6 mm/2 cylinder/689 cc

**COOLING :** Single Side-Mounted Aluminum Radiator

**DRIVE :** 6 Speed Sequential Gearbox, 520 Chain

**ELECTRONICS :** Performance Electronics PE3 ECU, RaceCapture Pro MK2 Data Logger

**ENGINE :** 2015 Yamaha FZ-07

**FR/RR TRACK :** 1270/1270 mm

**FRAME :** Carbon Fiber Driver Cell, Steel Tube Rear Frame

**FUEL SYSTEM :** Custom Fuel Rail, Bosch EV-14 Two-Spray Injectors

**FUEL TYPE :** 93 Octane

**MATERIAL :** Carbon Fiber, 4130 Steel

**OLWH :** 3150 x 1650 x 1200 mm

**SUSPENSION :** Unequal, Non-Parallel Double Wishbone, Pull Rod

**TIRE :** 20x7-13 D2704

**UNIQUE :** Anti-Roll Bar, Structural Nose Cone

**WEIGHT :** 600 lbs

**WHEELBASE :** 1600 mm



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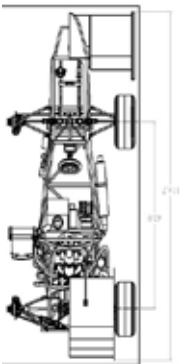
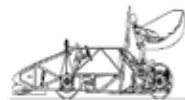
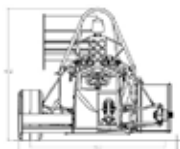
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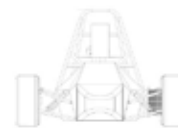
2018 marks CSUS' first major change to the overall vehicle platform since 2013. While powertrain has continued development with the 600cc 4-cylinder CBR engine, chassis has received a significant overhaul. The most notable changes include a synergetic steel tube space frame designed around a new suspension geometry, a move to 10" wheels, and the team's first ever aerodynamics package. Additionally, a new data acquisition system has dramatically increased testing, tuning, and vehicle management capabilities. All of this has been made possible thanks to the lessons passed on by CSUS FSAE alumni and the support of friends, family, and sponsors.



**BRAKE :** Wilwood GP200 calipers, Tilton MC  
**BSCD :** 67.5mm/42.5mm/4 cylinders/599cc  
**COOLING :** Dual pass radiator, electric water pump  
**DRIVE :** Chain driven Drexler LSD  
**ELECTRONICS :** Megasquirt ECU, AIM EVO-5 data logger  
**ENGINE :** Honda CBR600RR  
**FR/RR TRACK :** 48"/48"  
**FRAME :** 4130 steel space frame  
**FUEL SYSTEM :** Sequential EFI  
**FUEL TYPE :** 100 octane  
**MATERIAL :**  
**OLWH :** 116.7"x56.5"x47.5"  
**SUSPENSION :** Unequal length a-arm, pushrod, Ohlins TTX25 dampers  
**TIRE :** Hoosier R25B 18x6-10  
**UNIQUE :** Laser sintered titanium thermostat housing  
**WEIGHT :** 610lb  
**WHEELBASE :** 63"



For the 2018 FSAE Competition, Cal State LA's brightest engineering & technology students worked endlessly to bring GEM-18 to fruition. The design an evolution to GEM-17 where the team decided to keep the reliable Honda FSC600 engine to continue development of the intake & exhaust systems, as well as making improvements to the CVT transmission. Carbon composites make up not only the body but the intake plenum and custom seat. Brakes & Suspension systems were also improved for drivability. On the electronics side, a custom tablet displaying vital information made to give the driver a better sense of his/her driving experience. Frame was designed with simplicity and ergonomics in mind. All in all, GEM-18 was designed with the intent of giving the drivers a high performance driving experience behind the wheel of Cal State LA's finest built race car.

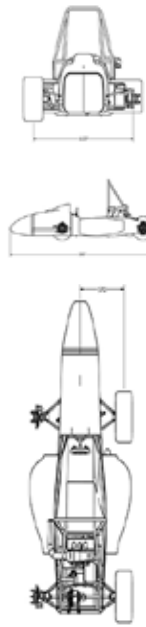


**BRAKE :** Wilwood Calipers with 8 inch rotors  
**BSCD :** 72.0, 71.5, 2 cylinders, 582cc  
**COOLING :** Single core Radiator  
**DRIVE :** CVT  
**ELECTRONICS :** AEM EMS-4  
**ENGINE :** Honda FSC600  
**FR/RR TRACK :** 1425mm, 1425mm  
**FRAME :** 1020 DOM Steel  
**FUEL SYSTEM :** Honda Direct Port Injection  
**FUEL TYPE :** 100 Octane  
**MATERIAL :** n/a  
**OLWH :** 2640mm, 1524mm, 1524mm  
**SUSPENSION :** Independent Double A Arm  
**TIRE :** 18x7.5-10 R25B Hoosier  
**UNIQUE :** n/a  
**WEIGHT :** 469  
**WHEELBASE :** 1569mm





FK03 represents a significant change in Formula Kentucky's approach to racecar engineering. With an emphasis on improving existing, track-proven designs, FK03 is set to be Formula Kentucky's fastest, lightest, and most polished design yet. We would like to thank our supporters, without which we would never have made it out of the garage.



**BRAKE :** Outboard Disc Brakes  
**BSCD :** 67.0mm/42.5mm/4/600cc  
**COOLING :** Radiator with aluminum hardlines  
**DRIVE :** Chain drive  
**ELECTRONICS :** Haltech Elite 1500 ECU and Racepack IQ3 Datalogger  
**ENGINE :** Honda CBR600RR  
**FR/RR TRACK :** 1143mm/1143mm  
**FRAME :** TIG Welded Mild Steel Space Frame  
**FUEL SYSTEM :** Electronic Fuel Injection  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** Mild Steel  
**OLWH :** 2642mm/1334mm/1181mm  
**SUSPENSION :** Short-long arm pull-rod  
**TIRE :** 18.0 x 7.5-10 Hoosier R25B  
**UNIQUE :** Electronic Paddle Shifters  
**WEIGHT :** 640 lbs  
**WHEELBASE :** 1600mm



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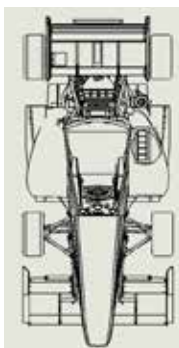
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UTA's 2018 entry, F-18, continues to use the Honda CBR600RR engine with a new focus on integrating the 10" Hoosier tires. F-18's design objectives targeted weight reduction, improved aerodynamic efficiency, and improved engine efficiency. This includes a new unsprung aerodynamics assembly and a redesign of several suspension and drivetrain components. Further emphasis was placed on improving our documentation of engineering practices to aid in engineering decisions made at a holistic level and knowledge transfer. The end result is a high powered car with an aggressive aerodynamics package at a wet weight of 200 kg.



**BRAKE :** Tilton Master Cylinders, Wilwood GP200 Brake Calipers

**BSCD :** 67mm/42mm/5/599cc

**COOLING :** Custom Radiator with Electric Water Pump

**DRIVE :** Chain Drive, Taylor Race Differential

**ELECTRONICS :** PE3 ECU

**ENGINE :** Honda CBR600RR

**FR/RR TRACK :** 1207mm/47.5", 1181mm/46.5"

**FRAME :** Steel Space Frame

**FUEL SYSTEM :** Electronic Fuel Injection

**FUEL TYPE :** 100 Octane

**MATERIAL :** 4130 Steel

**OLWH :** 3035mm/119.5", 1395mm/55", 1195mm/47"

**SUSPENSION :** Double Unequal Length A-Arms

**TIRE :** Hoosier 16.0X7.5-10 LCO

**UNIQUE :** Unsprung Aerodynamics, Electro-Pneumatic Paddle Shifters

**WEIGHT :** 590 lbs

**WHEELBASE :** 1651mm/65"



United States



The 2018 University of North Texas Formula SAE team is entering the 2018 Lincoln event as a sixth year team. After placing a team record 13th overall in 2017, the 2018 team set its sights on making much needed changes to many of the systems of our car. We used the knowledge of our past designs and their limitations, knowledge gained from a seasoned team, decision matrices, and new FSAE Rules guidelines to make design changes in many systems of the car. We made goals that included weight reduction, increased strength, maintaining reliability and a higher degree of accuracy in manufacturing that lead to redesigning many of the systems including suspension, chassis, powertrain and drivetrain while modifying systems such as electrical and ergonomics to compliment these new designs.



**BRAKE :** Dual Brembo P34G front, Single Rear. AP racing master cylinders.

**BSCD :** 76mm/49.6mm/3/675cc

**COOLING :** Side mounted 10x17.5x1.75 core dual pass radiator , 650 cfm fan

**DRIVE :** Quaife torque sensing, torque bias - Taylor Race Engineering

**ELECTRONICS :** Performance Electronics PE3

**ENGINE :** Triumph Daytona 675

**FR/RR TRACK :** 1270mm/1118mm

**FRAME :** 4130 Steel Space Frame

**FUEL SYSTEM :** Custom fuel rail, bosch fuel pump

**FUEL TYPE :** 93

**MATERIAL :** 4130 Steel, Carbon Fiber and Aluminum

**OLWH :** 117 in, 57.6 in, 45.6 in

**SUSPENSION :** SLA, Pullrod Actuated Spring/Damper, Adjustable Anti-Roll Bars

**TIRE :** Hoosier 20.5" x 7" x 13" R25B

**UNIQUE :** 3D Printed Intake (Ultem 9085)

**WEIGHT :** 580

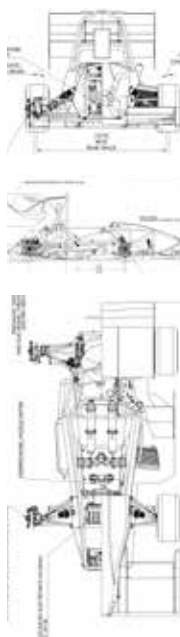
**WHEELBASE :** 61



United States



The car produced from the 2018 LOBOMotorSports is the result of an innovative engineering design building upon the accomplished LOBOMotorSports legacy. The car was developed to maturity to be a competitive car in the autocross arena capable of meeting the needs of the most advanced autocross racers. With a focus on reliability, the LMS-18 car's powerhouse is a KTM 690 Duke that delivers up to 60 horsepower. Utilizing advanced composite materials in conjunction with high-strength lightweight alloy steels, the LMS-18 team has developed an efficient, strong, and lightweight frame and aerodynamic package. The highly efficient aerodynamic package provides an excellent balance between downforce and drag increasing the capabilities of the car in turns. The suspension system features a double wishbone design with both direct and pushrod actuated shocks that allow for on track tuning. The thorough testing of the LMS-18 car under various conditions and parameters have allowed the LMS-18 team to mature the design of the car allowing for its reliability, assured safety and the high performance it is expected to have at the 2018 Lincoln Formula SAE competition.



**BRAKE :** Cast Iron Rotors, Tilton 76-Series Master Cylinders, Wilwood GP200 and PS1  
**BSCD :** 105.0 mm/80.0 mm/1 Cylinder/693 cc  
**COOLING :** Single Core Radiator  
**DRIVE :** Pneumatically Actuated 5-speed Gearbox, Chain Drive with Rekluse Clutch  
**ELECTRONICS :** Custom Harness with MoTeC ECU and Aim MXL 2 Data Logger  
**ENGINE :** KTM 690 Duke  
**FR/RR TRACK :** 1270 mm/1219 mm  
**FRAME :** Welded Steel Space Frame  
**FUEL SYSTEM :** Fuel Injected  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** 4130 Chromoly Steel Frame, Carbon Fiber Aerodynamic Package  
**OLWH :** 2965 mm, 1478 mm, 1116 mm  
**SUSPENSION :** In plane, double, unequal length A-Arm direct acting shock  
**TIRE :** 18.0x6.0-10 R25B Hoosier  
**UNIQUE :** Adjustable Pedal Box, Paddle Shift, Elliptical Chain Tensioner  
**WEIGHT :** 585 lbs  
**WHEELBASE :** 1575 mm



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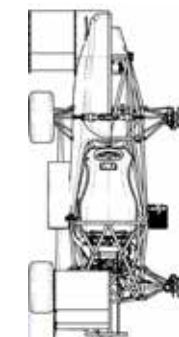
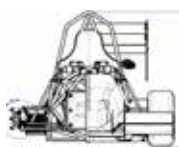
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Kennesaw State University's newest prototype for 2018 designated KS3 is aimed at bringing a low-cost, low weight, all around performer to the recreational motorsport enthusiast. To capture this market, the KS3 prototype has been developed based on the KS2's elegantly simple design with a focus on improved ergonomics and aerodynamics while maintaining its in-house manufacturability and serviceability. In order to better understand how our engineering changes affect our vehicle, we have approached this year's prototype on improvements with an emphasis on minor yet impactful design changes. To implement a continuous improvement approach to the prototypes, the following document follows the changes made between the KS3 and its predecessor the KS2.



**BRAKE :** 4 Wheel Disc  
**BSCD :** 636cc 4cyl  
**COOLING :** Parallel Radiators  
**DRIVE :** Carbon Spool  
**ELECTRONICS :** Megasquirt MS3 Pro Evo  
**ENGINE :** Yamaha R6  
**FR/RR TRACK :** 47.71in/47.71in  
**FRAME :** Chromoly Spaceframe  
**FUEL SYSTEM :** 45psi, AEM Fuel Pressure sensor, OEM R6 fuel pump  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** Carbon Fiber  
**OLWH :** 116.6535in, 56.10in, 44.44in  
**SUSPENSION :** SLA Pushrod  
**TIRE :** Hoosier LCO 18x6.0-10  
**UNIQUE :** Advanced carbon fiber intake, Filament wound carbon spool  
**WEIGHT :** 580  
**WHEELBASE :** 1537mm/60.51in

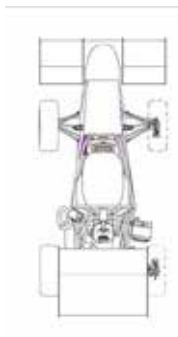
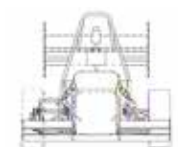


The University of North Dakota Formula SAE Student Organization is proud to present their entry into the 2018 FSAE Lincoln Competition.

The goal of this student organization is design and build an open wheel style car for the annual competitions, as well as get new college students involved in a program that provides real world engineering experience. The team also gives back to the community by displaying and driving the car in various parades, event, and track days across North Dakota following the FSAE competition. This year's team is comprised of individuals from several different areas of study including Mechanical Engineering, Business, and Aviation.

The major design goals for this year's car were to implement an effective aerodynamics package, as well as update the suspension to accommodate for the increased downforce; these additions also presented an opportunity to optimize the car's roll parameters. Another large improvement was utilizing the engine as a structural member for the differential.

As always, the team would like to thank our sponsors. This project and organization would not be possible without the support we receive from the North Dakota community.



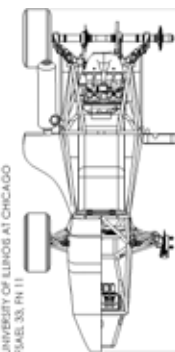
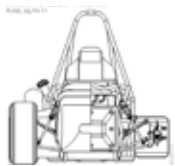
**BRAKE :** 4 Corner, Hydraulically Actuated, Disk Brakes  
**BSCD :** 67mm/42.5mm/4/599cc  
**COOLING :** Mishimoto Dual Pass, Side Mounted, Radiator  
**DRIVE :** Drexler Limited Slip  
**ELECTRONICS :** Haltech Elite 1500 ECU, Bargraph Tachometer, Launch  
**ENGINE :** Honda CBR 600 F4i  
**FR/RR TRACK :** 1220/48, 1220/48  
**FRAME :** Tubular Spaceframe  
**FUEL SYSTEM :** Low Pressure, Electronic Port Injection  
**FUEL TYPE :** 93 Octane Petrol  
**MATERIAL :** 4130 Chromoly Steel  
**OLWH :** 3012/118.6, 1420/55.9, 1265/49.8  
**SUSPENSION :** Unequal Length Double Wishbone Suspension  
**TIRE :** 21X7X13 R25B  
**UNIQUE :** Luxury Leather Seat  
**WEIGHT :** 659  
**WHEELBASE :** 1550/61







The F18 vehicle marks UIC Motorsport's Decade Year of Competition. Starting in 2008, the members of our team have design, manufactured, and competed 10 vehicles. This year, the team focused on reducing vehicle complexity and cost. By utilizing a solid rear axle and direct acting shocks in our suspension design, we have accomplished both of our goals with a savings of close to \$1000. Also, with plans to introduce a full aero package next year, we have implemented a diffuser and functional side pods to begin gathering data. Our team has been set on improving our transfer of knowledge and documentation of designs. A combination of a well established team and data collected from previous designs allows us to optimize our vehicle with each competition year.



**BRAKE :** Tilton 76 Masters, Wilwood PS1, 4130 Floating Rotors

**BSCD :** 67.0mm/42.5mm/6 Cylinder/599cc

**COOLING :** 9x9x2in Single Pass Radiator

**DRIVE :** 420 Chain, Solid Rear Axle

**ELECTRONICS :** EL-129 w/ Custom Data Logger

**ENGINE :** Honda CBR 600 F4i

**FR/RR TRACK :** 1200mm/1216mm

**FRAME :** 4130 Chromoly Space Frame

**FUEL SYSTEM :** Multipoint Port Injection

**FUEL TYPE :** 93 Octane

**MATERIAL :** Carbon Fibre con Billet Aluminum

**OLWH :** 2680mm, 1216mm, 1163mm

**SUSPENSION :** SLA Front / 4 Link Rear

**TIRE :** 6.0/18.0-10 LCO

**UNIQUE :** Solid Rear Axle w/ Roll Steer

**WEIGHT :** 610 Lbs

**WHEELBASE :** 1600mm



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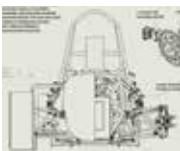




Longhorn Racing 2018 has been designed, manufactured and fabricated exclusively by the students at the University of Texas at Austin. Through the knowledge and capabilities within Longhorn Racing, the 2018 car was conceived and created with the goal of being a top-10 vehicle at the 2018 Lincoln FSAE competition. The LR18 vehicle system uses a 4-cylinder CBR600RR engine with peak torque of 58.4 Nm. Through simulation and testing, the frame was built with a torsional rigidity of 2123 N-m/deg, using 4130 steel tubing. Adjustability was a major design goal for the team overall. The cockpit has an adjustable headrest, pedal assembly, and seat insert. The vehicle has adjustable camber, caster, toe, Ackermann, and multiple-setting blade style anti-rolls bars. This gives the team the ability to set the vehicle up for a multitude of drivers and track conditions, making a robust autocross vehicle. Through testing and tuning, the LR18 vehicle will be competitive in all events at this year's competition and continue growing the long history of Longhorn Racing at the University of Texas at Austin.



Featuring Bruin Racing's first ever dedicated aero elements, Bruin Mk. IV was designed using thorough analysis and improved data acquisition to optimize performance and save weight. Refined chassis design allowed for significantly higher torsional stiffness despite a decrease in weight, while more precise FEA and our first use of the Optimum Suite allowed for more ideal suspension design. Combined with revised steering geometry and the downforce provided by our new undertray and bargeboards, these traits promise to make Bruin Mk. IV our best-handling car yet. A redesigned pedal box, steering wheel, and seat with custom foam inserts offer more adaptive and comfortable ergonomics as well to aid our drivers in performing to the best of their abilities. Our continued use of the Yamaha YZ450FX engine and Drexler LSD allowed our team to focus on optimizing the tuning of both systems based on simulation and test data, with great emphasis on improved fuel injection mapping. The addition of onboard data acquisition helped collect this test data, with more information being relayed to the driver through the dash pod as well. Manufacturing planning also yielded better production processes.



**BRAKE :** Tilton 78 Series Master Cylinders/Wilwood Calipers

**BSCD :** 67mm/42.5mm/4/599cc

**COOLING :** Rear Mounted, 214 cu. in, Aluminum Core Radiator

**DRIVE :** Rear Wheel Drive with Drive Limited Slip Differential

**ELECTRONICS :** PE3 ECU

**ENGINE :** Honda CBR600RR

**FR/RR TRACK :** 1283mm/1232mm

**FRAME :** Tubular Steel Space Frame

**FUEL SYSTEM :** Denso 199cc/min Fuel Injectors

**FUEL TYPE :** 93 Octane

**MATERIAL :** 4130 Steel Round and Square Tubing

**OLWH :** 2807mm/1473mm/1219mm

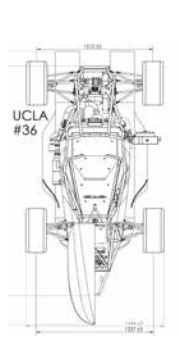
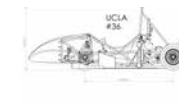
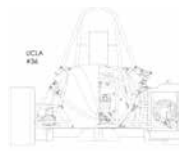
**SUSPENSION :** Double Unequal Length A-Arm

**TIRE :** 20.5x7.0-13/R25B

**UNIQUE :** Student Designed and In-House Built Super-charger

**WEIGHT :** 620

**WHEELBASE :** 1626mm



**BRAKE :** Wilwood Calipers, Tilton Master Cylinders/Bias Bar, Custom Floating Rotors

**BSCD :** 97 mm/60.8 mm/1 cyl/449 cc

**COOLING :** Side-mounted Mishimoto 2-Core Downflow Radiator w/ 100 CFM Fan

**DRIVE :** Chain and Sprockets w/ Drexler Adjustable Clutch-Type LSD

**ELECTRONICS :** Aftermarket EFI using AEM Infinity Series 3 ECU

**ENGINE :** 2017 Yamaha YZ450FX

**FR/RR TRACK :** 1227, 1212/48.3, 47.7

**FRAME :** Welded Tubular Space Frame

**FUEL SYSTEM :** Bosch EV14 Compact Injectors, DeatschWerks DW100 Fuel Pump

**FUEL TYPE :** 100 Octane Gasoline

**MATERIAL :** 4130 Chromoly Steel Frame, Carbon Fiber Body

**OLWH :** 2810, 1444, 1100/110.6, 56.9, 43.3

**SUSPENSION :** Double Wishbone, Pushrod Actuated Damper

**TIRE :** 6.0/18.0 - 10 Hoosier LCO

**UNIQUE :** 3D Printed Intake, Titanium Exhaust

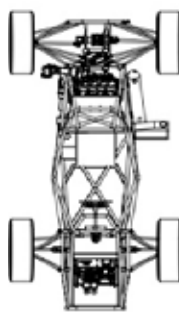
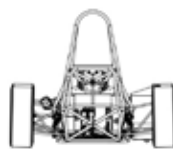
**WEIGHT :** 557.8 lb

**WHEELBASE :** 1534/60.4





The OgopoGo 18, is proudly presented by UBCO Motorsports. Power is generated by our Honda CBR 600rr and is passed to our Drexler differential by chain drive. The newly added removable rear subframe houses our drivetrain components in one package. The dry sump oil system allows constant oil pressure even during high "g" turns. The machined aluminum uprights and lightweight hubs have decreased our weight. The double wishbone suspension keeps our car stable and ensure that we always have traction. The Ohlin's shock and springs also help ensure proper load transfer. The Haltech ECU allows the computer to learn and improve our tune. The electronic shift mechanism allows the driver to change gear almost instantly. The electronic throttle body also allows for clutch less down-shifting. By re-implementing driver aids like traction control and launch control in addition to the new shifting, we have created a race car that is easy to drive, and to succeed with. To top off our excellent mechanical systems our new OZ rims and fibreglass bodywork create an excellent look for our car.



**BRAKE :** Wilwood PS-1 calipers front and rear. Custom stainless steel rotors.

**BSCD :** 67mm/42.5mm/4/599cc

**COOLING :** Side mounted radiator with 10" fan

**DRIVE :** Chain drive, Drexler differential

**ELECTRONICS :** Haltech Elite 1500 ECU, electronic shift, AiM dash

**ENGINE :** Honda CBR 600rr

**FR/RR TRACK :** (1270mm/50")/(1270mm/50")

**FRAME :** 4130 Tubular space frame with aluminum rear subframe

**FUEL SYSTEM :** In tank OEM pump, dual injector rails

**FUEL TYPE :** 100 Octane

**MATERIAL :** Steel, Aluminum, Fiberglass

**OLWH :** 2810mm, 1450mm, 1200mm

**SUSPENSION :** Unequal length a-arm suspension with pullrod front and pushrod rear

**TIRE :** 20.5x7" RB25 Hoosier Slicks

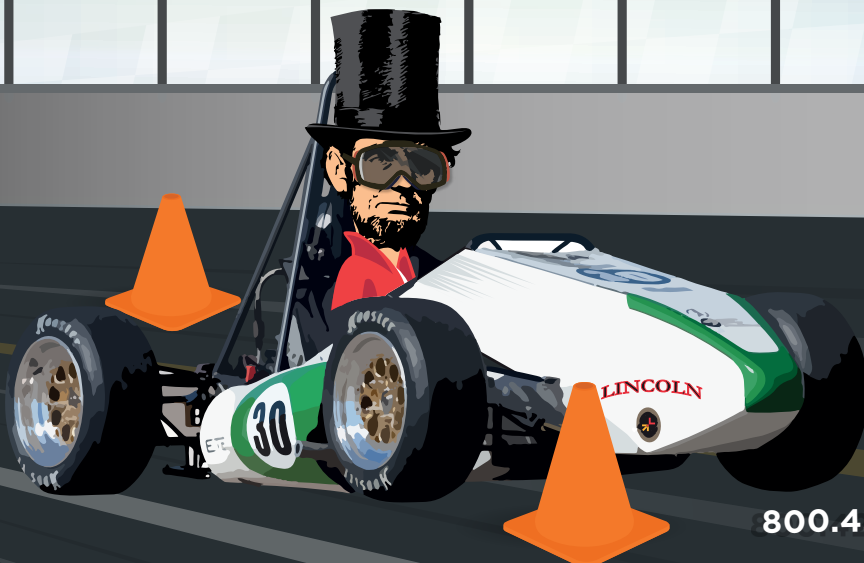
**UNIQUE :** Aluminum rear subframe, dry sump oil system, electronic shift

**WEIGHT :**

**WHEELBASE :** 1778mm/70"

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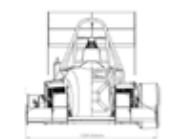


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## University of Nebraska - Lincoln Husker Motorsports



Husker Motorsports is very proud to show its seventh vehicle in the FSAE competition series. This year's vehicle is an iteration of the previous year, however there are some major changes to note. This year's vehicle is the first in team history to feature a full aerodynamics package. The team has also completely reworked the suspension system to provide maximum adjustability and tunability. The team is not only striving to produce a vehicle that performs well, but is also serviceable and aesthetically pleasing.



**BRAKE :** Floating 4130 steel rotors, Wilwood caliper, Tilton 78-Series cylinders  
**BSCD :** 67/ 45.1/4/636cc  
**COOLING :** Dual, side mounted, cross flow radiators  
**DRIVE :** 520 chain driven, Drexler limited slip differential, cv axles  
**ELECTRONICS :** Megasquirt ECU, AIM EVO 4 DAQ, Ultrabatt Batteries  
**ENGINE :** 2016 Kawasaki ZX-636R  
**FR/RR TRACK :** 1219/1168mm  
**FRAME :** Steel tube frame  
**FUEL SYSTEM :** 3-Bar Batch Port Injection  
**FUEL TYPE :** E-85  
**MATERIAL :** 1020, 6061-T6, 7075-T6  
**OLWH :** 115.54, 52.75, 45.36 (in)  
**SUSPENSION :** Unequal length double A-Arm, F: pullrod actuation, R: pushrod actuation  
**TIRE :** Hoosier 6x10 R25B  
**UNIQUE :** Full aerodynamic package, Modular corner assemblies, Bolt on rear plate  
**WEIGHT :** 650  
**WHEELBASE :** 63.5"



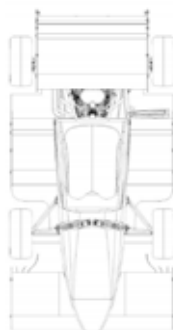
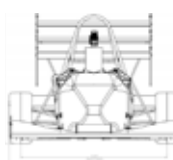
United States

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## Arizona State University - Tempe Sun Devil Motorsports



Low-cost but highly featured and highly capable full-aerodynamics track car, designed for an average weekend autocross racer capable of towing their vehicle to a track. Engineered for fun and low-maintenance operation for diverse racers.



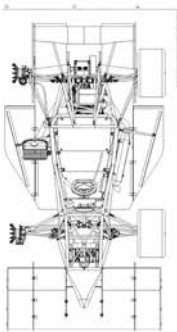
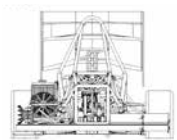
**BRAKE :** Tilton 76 series, Brembo 2.34, Drilled Slotted Rotors  
**BSCD :** 83mm/60mm/2cyl/649cc  
**COOLING :** Water Cooled  
**DRIVE :** Chain Drive, Drexler Differential  
**ELECTRONICS :** Electric Paddle Shifting, Full Data Acquisition System,  
**ENGINE :** 2015 Kawasaki Ninja 650  
**FR/RR TRACK :** 1321 mm / 1321 mm  
**FRAME :** Tube Space-Frame  
**FUEL SYSTEM :** Multiport Electronic Fuel Injection  
**FUEL TYPE :** 97 Octane  
**MATERIAL :** 4130 Chromoly  
**OLWH :** 3000 mm, 1499 mm, 1200 mm  
**SUSPENSION :** Pushrod Actuated, Unequal length A-Arm  
**TIRE :** 10"-18"x6" RB25 front, LCO rear  
**UNIQUE :** Low-maintenance electronic shifting, innovative electronics packaging  
**WEIGHT :** 284 kg  
**WHEELBASE :** 1600 mm



United States



B18, Berkeley Formula Racing's 2018 vehicle, is a lightweight, small rear-engined vehicle. We run E85 fuel with a custom tune on a KTM 350 engine and a five-speed transmission. B18 has independent front and rear double wishbone suspension, with pull rods in the front. The Aerodynamics package consists of a two-element front wing, a four element drooped biplane rear wing, and an under-tray with sidepods and a diffuser. We attempt to maximize downforce in order to increase cornering speed. We have a powder-coated steel spaceframe chassis that is TIG welded together and designed to minimize weight while maintaining a high torsional stiffness and minimize the conduction of engine vibration throughout the vehicle. Our Drivetrain is composed of a single chain reduction, a Drexler limited slip differential, and carbon fiber half shafts. Extensive on car testing is done to ensure shock loading from launches does not cause a failure, and allows us to get a very good estimate of the forces seen by the driveline and remove as much weight from the system as possible.



**BRAKE :** Wilwood GP320 Front, Brembo P32 Rear  
**BSCD :** 88/57.5/1/350  
**COOLING :** Water Cooled YFM 660 Raptor Radiator  
**DRIVE :** 520 chain, Drexler LSD, Carbon Half-shafts  
**ELECTRONICS :** MOTEC M400 ECU, ADL2  
**ENGINE :** KTM 350 SX-F  
**FR/RR TRACK :** F: 50 in R: 50 in  
**FRAME :** 4130 Steel Tube Spaceframe TIG Welded  
**FUEL SYSTEM :** Direct Port Injection  
**FUEL TYPE :** E85  
**MATERIAL :** CF Bodywork, Rubber Tires, also Metal  
**OLWH :** L: 115 in W: 60.3 in H: 47 in  
**SUSPENSION :** Front Pullrod Actuated Dual Shocks, Rear Pushrod Actuated Dual Shocks  
**TIRE :** 18 x 7.5 - 10 R25b  
**UNIQUE :** Drooped 3D Biplane Rear Wing  
**WEIGHT :** 525 lbs  
**WHEELBASE :** 60 in



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## Oklahoma State University Oklahoma State Racing



The OSR2 is one of Oklahoma State Racing's most well designed cars to date. Our new design philosophies combined with our attention to detail has allowed us to design a fundamentally sound vehicle. Most of the designs for the OSR2 have been designed with reliability and performance in mind.

We would like to thank our family, friends, and sponsors for their continued support.

50

## Southern Methodist University Hilltop Motorsports

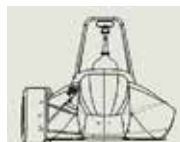
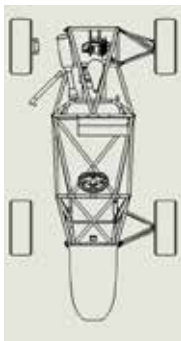


2018 marks just the third competition year for Southern Methodist University's Formula SAE team. Hilltop Motorsports is looking to improve upon the strong foundation we have established over the course of the past two years competing at Lincoln. Despite the numerous setbacks we encountered this year, we are back and very excited to return to competition once again with our newest and most advanced car to date, Peruna '18, to prove that no amount of adversity can stop us. We have spent countless hours over the course of the year designing, building, and refining our car and are ready to showcase its power on the track during the dynamic events here in Lincoln.

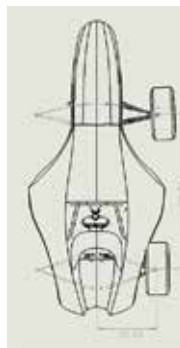
Our team would like to thank our friends, family, supporters and sponsors for their continued support! Pony Up!



**BRAKE :** Wilwood calipers  
**BSCD :** 95/63.4/1/449cc  
**COOLING :** Side Mounted Radiator  
**DRIVE :** Quaife-LSD Taylor Race Differential  
**ELECTRONICS :** PE3 ECU, RaceCapture/Pro 2  
**ENGINE :** YFZ-450r  
**FR/RR TRACK :** 1219 mm/ 1219 mm  
**FRAME :** Spaceframe  
**FUEL SYSTEM :** Fuel injection  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** 4130 Chromoly Steel  
**OLWH :** 2514 mm, 1403 mm, 1141 mm  
**SUSPENSION :** Double unequal length A-arms, push rod actuated  
**TIRE :** Hoosier 18.0x6-10 R25B  
**UNIQUE :**  
**WEIGHT :** 530 lbs  
**WHEELBASE :** 1535mm

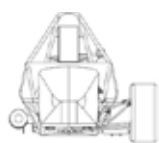


**BRAKE :** Wilwood GP320 Calipers  
**BSCD :** 76/49.6/3/675  
**COOLING :** Triumph OEM radiator with electric water pump  
**DRIVE :** Chain driven rear torsion Taylor Racing Differential  
**ELECTRONICS :** Triumph OEM ECU with Bazzaz fuel controller AIM EVO4 data logging  
**ENGINE :** Triumph Street Triple  
**FR/RR TRACK :** 51 in/ 47 in  
**FRAME :** MIG welded chromoly tubing space frame  
**FUEL SYSTEM :** Triumph OEM fuel rail and external fuel pump  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** Aluminium, Steel, Titanium, Magnesium, Fiberglass, Carbon Fibre, Plastic  
**OLWH :** 115in, 53in, 46in  
**SUSPENSION :** 4 wheel independent double A arm push rod suspension  
**TIRE :** 20.5x7-13 R25B Hoosier  
**UNIQUE :** All aluminum rear subframe  
**WEIGHT :** 650 lbs  
**WHEELBASE :** 60.5 in





The overall size of the vehicle was reduced by 5" in the wheelbase and 6" on both front and rear track widths. A plate subframe design for the rear of the vehicle was conceived to reduce the time and effort required to remove the powertrain assembly, and aid in mounting of the differential. A complete rethink of the drive-train started with the wheel hubs and moved inwards, with the aim of improving reliability and function. Packaging the Yamaha R6 engine in the much smaller frame required an intake redesign with the goal of relocating the throttle body and reducing the overall height. DIYAutoTune's, "MS3x", ecu was chosen for its open format, compatibility with data and driver information systems.



**BRAKE :** 1" piston Wilwood calipers  
**BSCD :** 65.5mm(2.58in)/55.4mm(2.18in)/4/599.8cc  
**COOLING :** Side-mounted radiator  
**DRIVE :** chain  
**ELECTRONICS :** MS3x ECU, AIM EVO4  
**ENGINE :** Yamaha YZF-R6  
**FR/RR TRACK :** 1193mm(46.9in)/1168mm(46.0in)  
**FRAME :** Chromoly Tubing  
**FUEL SYSTEM :** Return type EFI  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** Chromoly  
**OLWH :** 2540mm(100in)/1346mm(53in)/991mm(39in)  
**SUSPENSION :** Double Wishbone Pullrod  
**TIRE :** 6/18-10 LCO  
**UNIQUE :** Removable Subframe  
**WEIGHT :** 186kg (410lb)  
**WHEELBASE :** 1575mm(62in)



United States

**SPACEX**

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— Elon Musk

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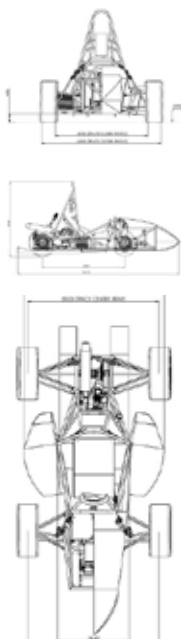




Reliability was the driving force of the 2018 Rainbow Warrior Racing (RWR) team's design approach. In order to help mitigate complications RWR has had in the past, designs were chosen to be simpler and dependable. In addition, four months of running-car testing were allotted to fine-tune the vehicle as a whole and ensure that any failures were caught and addressed early on.

The 2018 team's vehicle features a carbon fiber body complete with tribal artwork, carbon fiber intake plenum, upgraded chain tensioner system, robust shift-lever and a weight reducing suspension redesign.

Being from Hawaii, RWR is faced with unusual challenges as an FSAE team, such as a lack of testing sites and lengthier and costlier shipping options. However, our program has thrived on the generosity of our small-town local community, and are well-practiced in finding creative ways to solve our problems. After a top gear year, the Rainbow Warrior Racers are proud to represent the State of Hawaii at FSAE Lincoln 2018.



**BRAKE :** Front Wilwood GP320, Rear Wilwood GP 200, Tilton Adjustable Pedal Tray  
**BSCD :** 95mm/63.4mm/Single/449  
**COOLING :** Mishimoto Aluminum Radiator, 950 cfm fan  
**DRIVE :** Rear Wheel Limited-Slip Drexler Differential  
**ELECTRONICS :** Vortex X10 ECU  
**ENGINE :** YFZ450R  
**FR/RR TRACK :** Front 54 in, Rear 55 in  
**FRAME :** 4130 Steel Space Frame, Black Powder Coating  
**FUEL SYSTEM :** OEM YFZ450R Fuel Pump Assembly  
**FUEL TYPE :** 100 Octane  
**MATERIAL :** Steel, Carbon Fiber, Aluminum  
**OLWH :** Length 120 in, Width 66 in, Height 60 in  
**SUSPENSION :** Double-A Arm Push Rod  
**TIRE :** Front 20.5 x 7.0-13, Rear 20 x 7.5-13  
**UNIQUE :**  
**WEIGHT :** 640 lbs  
**WHEELBASE :** 62 in



Our machine concept keyword is EASYFASTURN.

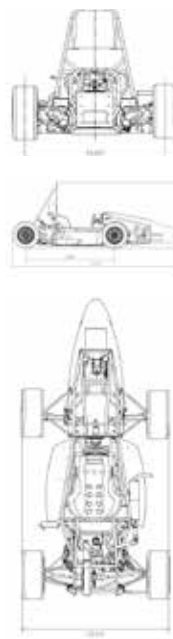
This word is consist of "EASY", "FAST" and "TURN".

In order to realize high cornering speed for beginner racer who is our target user. we aim the machine weight reduction and lower center of gravity.

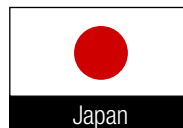
In addition, we adopt the new engine CRF450RX from CRF450X and change a part of rear frame steel to aluminum.

As a result, we archive the machine weight reduction and engine power up from Japan competition 2017.

So, we aim skidpad time 5.0s at FSAE Lincoln competition 2018.



**BRAKE :** Out Board / NISSIN Caliper  
**BSCD :** 96mm / 62.1mm / 1Cylinder / 449cc  
**COOLING :** HORNET600 Radiator  
**DRIVE :** Chain Drive  
**ELECTRONICS :** ECU Control  
**ENGINE :** CRF450RX (PE07)  
**FR/RR TRACK :** FR : 1180mm/46.5inches RR : 1220mm /48.0inches  
**FRAME :** Space Frame  
**FUEL SYSTEM :** Fuel Injection System  
**FUEL TYPE :** 100 Octane  
**MATERIAL :** Steel,Aluminum,GFRP  
**OLWH :** 2710mm/106.7Inches,1410mm/55.5Inches,1135mm/44.7Inches  
**SUSPENSION :** Uniquel length Aarm,pull rod type link suspension(using bell crank)  
**TIRE :** 6.0/18.0-10 , LCO Hoosier  
**UNIQUE :** Air suspension  
**WEIGHT :** 235.2kg  
**WHEELBASE :** 1530mm/60.2Inches







The University of Arizona Formula SAE team is competing in Lincoln for the sixth time with its newest vehicle, the WF18. The WF18 features a GSXR 600 engine producing 78 hp and an amazing sound, a fully-adjustable, tire-data backed suspension system, and a chassis that is stiff, light weight, and ergonomic. By placing a strong emphasis on design simplicity and early completion, the WF18 is expected to be Arizona's most competitive car to date.

We would like to thank our friends, families, and sponsors for their continued support of our program. Without you none of this would be possible.



**BRAKE :** Brembo P34G Caliper, Steel  
**BSCD :** 67.0mm/ 42.5mm/Inline Four/599  
**COOLING :** Single Radiator, Water Cooled  
**DRIVE :** Chain Driven to Torsen LSD  
**ELECTRONICS :** PE3 ECU, Custom Driver Display, Custom Telemetry  
**ENGINE :** Suzuki GSXR 600  
**FR/RR TRACK :** 1270mm/ 1219mm  
**FRAME :** Tubular Steel Space Frame  
**FUEL SYSTEM :** Fuel Injection  
**FUEL TYPE :** E85  
**MATERIAL :** 4130/ DOM 1020  
**OLWH :** 2859mm/1375mm/1143mm  
**SUSPENSION :** Double Wishbone, Unequal Length A-Arm, Fully independent  
**TIRE :** 20.0 x 7.0 -13, R25B Hoosier  
**UNIQUE :** Fuel Adjustability, Electronic Shifter  
**WEIGHT :** 625 lbs  
**WHEELBASE :** 1727.2mm



United States




# WACKER

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## PROUD SUPPORTER — FORMULA SAE COMPETITION.



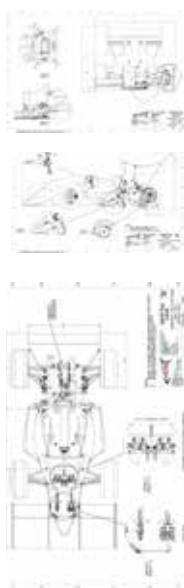
WACKER extends our thanks and appreciation to the many volunteers and corporate sponsors who enable the Formula SAE competition, providing a venue for the competitive growth and education of the next generation of engineers. Throughout WACKER's 100-year-plus history, the education of students and employees and community outreach continue to be corporate priorities and keys to success.

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The main goals set by the 2018 design team were to minimize weight of suspension and body systems, and to have a reliable and serviceable powertrain while having a large peak power output. The overall intention of this design was to result in a prototype with enhanced drivability for an amateur road course driver and keep the manufacturing of the prototype simple.

The suspension system uses a double unequal length converging A-arm configuration, with push and pull rod actuated energy absorption in the front and rear respectively. The chassis was fabricated using CNC profiled 4130N tubing and has a predicted weight of 64 lbs and a theoretical torsional stiffness of 1469 Nm/deg. The body is comprised of 6 primary components manufactured from 1 mm thick, three-layer 200 gsm carbon fiber, with an additional layer added near body mounting locations. The powertrain consists of a Yamaha WR450F single cylinder engine with a Honeywell GT-06 turbocharger. The fuel tank also acts as a diffuser which directs flow from the floor tray into the intercooler. The electronics system includes a lightweight lithium ion battery and custom datalogger.



**BRAKE :** Floating rotor design, Tilton 77 Master Cylinders, Brembo P34 Calipers

**BSCD :** 95mm/63.5mm/1/450cc

**COOLING :** Dual sidepod mounted, total core area of 62 cm<sup>2</sup>

**DRIVE :** 520 Chain

**ELECTRONICS :** Custom Designed powerboard, Anti-gravity AG-1201 Lithium Battery

**ENGINE :** WR450F, Turbo

**FR/RR TRACK :** 1250mm/1250mm

**FRAME :** 4130 Chromoly Steel Spaceframe

**FUEL SYSTEM :** Custom 5052 Aluminum Welded tank, 3.9L capacity

**FUEL TYPE :** 100 Octane

**MATERIAL :**

**OLWH :** 3014mm/1473mm/1186mm

**SUSPENSION :** Converging Unequal Length A-Arm

**TIRE :** 20.5x7.0-13 Hoosier R25B

**UNIQUE :** Electronic conversion of OEM shifting, turbo with custom intercooler

**WEIGHT :** 559lb

**WHEELBASE :** 1549mm



UP RACING proudly presents UPR-618. Our main goal? To be the first Mexican team to finish all the tests, including the endurance. Being one of the newest teams to compete, we have one thing on our minds, to prove that other teams experience can be challenged with talent and creativity.



**BRAKE :** 4-Disc Brake, Wilwood GP200 Calipers

**BSCD :** 67 / 42.5 / 4 / 599

**COOLING :** Water cooled

**DRIVE :** Rear Wheel Chain Drive, Taylor differential

**ELECTRONICS :** OEM ECU

**ENGINE :** Honda CBR600RR 2007

**FR/RR TRACK :** 1204,37 mm / 1204,37 mm

**FRAME :** AISI 1020/1026 DOM Tube

**FUEL SYSTEM :** Stock fuel system

**FUEL TYPE :** 93 octane

**MATERIAL :** Fiberglass

**OLWH :** 2758.81 mm / 1388.42 mm / 1275.5 mm

**SUSPENSION :** Direct actuated springs and dampers

**TIRE :** 20.5x7.0-13 R25B Hoosier

**UNIQUE :** Adjustable Pedals, All welded with TIG by team members, handmade harness

**WEIGHT :** 600 lb

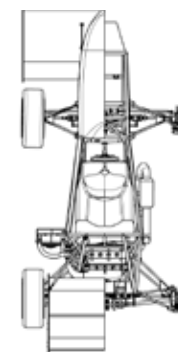
**WHEELBASE :** 1550 mm







USC Racing's 2018 competition vehicle, SCR-18, aims to improve upon the 2017 competition vehicle with emphasis on weight reduction (508lbm to 480lbm: a 5.5% decrease), improved dynamic vehicle performance and ease to drive. SCR-18 is centered around a steel spaceframe with a 13" wheel package actuated by a pushrod, double wishbone front and rear suspension package, powered by a 600cc Yamaha R6 engine, enhanced by a full aerodynamic package, and controlled by a PE3 ECU. The weight loss goal is achieved from chassis (net 10lbm loss), powertrain (net 12lbm loss), and aerodynamics (net 12lbm loss). Vehicle dynamics are improved with 10% more theoretical maximum lateral force and 8% more theoretical maximum longitudinal force (based on Tire Test Consortium data), an aerodynamic package optimized for the desired over-steer characteristics of the car, and optimized cam profiles for increased torque in the historically most utilized operating regions of the engine. Finally, drivability was addressed with the addition of an electronic paddle shifting platform and a user adjustable launch control system.



**BRAKE** : Wilwood PS1 calipers, Custom 4130 Floating Rotors  
**BSCD** : 65.5/44.5 mm/4cyl/600cc  
**COOLING** : Custom Double Pass Radiator w/ Electric Pump  
**DRIVE** : 520 Chain Drive w/ Drexler LSD  
**ELECTRONICS** : PE3 ECU w/ AiM Sports DAQ  
**ENGINE** : Yamaha R6  
**FR/RR TRACK** : 1219/1219 (mm)  
**FRAME** : Space Frame  
**FUEL SYSTEM** : Digital Fuel Injection  
**FUEL TYPE** : E85  
**MATERIAL** : 4130 Chromoly Steel  
**OLWH** : 3026/1428/1184 (mm)  
**SUSPENSION** : Unequal, nonparallel, double A-arms; push rod actuated  
**TIRE** : 20x7" Goodyear D2704  
**UNIQUE** : Driver adjustable launch control  
**WEIGHT** : 630  
**WHEELBASE** : 1575 (mm)

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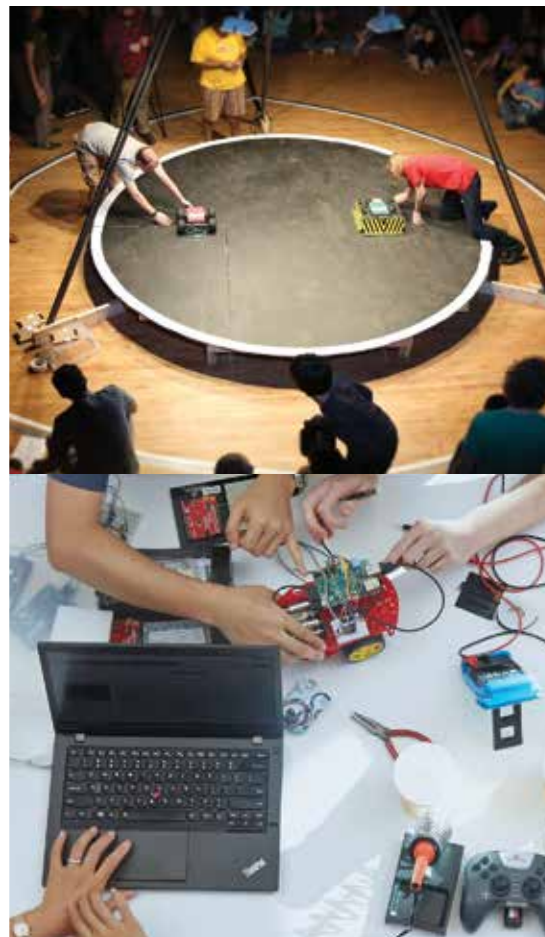
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l = sym + 3*(s
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lfa(j) = alfa(j
l = 6-del;
alfa * 2/3;
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length(alf1));

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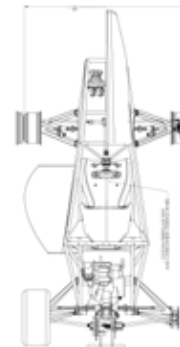
Accelerating the pace of engineering and science







The 2017 Chico State Wildcat Racing team, encouraged by our performance at FSAE Lincoln 2016, set upon the 2017 season with enthusiasm and ambition. Weight reduction, suspension improvement, and increased drivetrain output were main areas of consideration. Special emphasis was placed on improving our designs through accurate and thorough data collection directed by established documentation deadlines and standards. Design considerations for 2017 included: replacing all mild steel components with lighter weight materials, a complete aerodynamics package, rear differential vs. the spool design of years past, and the use of a single cylinder, electronically fuel-injected dirt bike engine.



**BRAKE :** Hydraulic  
**BSCD :** 95 mm / 63.4 mm / single cylinder / 449cc  
**COOLING :** Liquid  
**DRIVE :** Locked Spool  
**ELECTRONICS :** MoTeC M800  
**ENGINE :** WR450  
**FR/RR TRACK :** 1320 mm / 1220 mm  
**FRAME :** Space Frame  
**FUEL SYSTEM :** Fuel Injection  
**FUEL TYPE :** 93 octane  
**MATERIAL :** Steel  
**OLWH :** 2794 mm / 1524 mm / 1016 mm  
**SUSPENSION :** Double Wishbone  
**TIRE :** R25b  
**UNIQUE :**  
**WEIGHT :** 390  
**WHEELBASE :** 1613 mm



The 2017-18 Pioneer Racing Formula car was completely redesigned from previous years vehicles. This seasons car focuses on simplicity and reliability. The vehicle is powered by a single-cylinder Yamaha WR450F engine with CFD optimized intake and exhaust systems. The suspension has been redesigned in order to take advantage of using composite materials. The steering system has been redesigned to eliminate the need of U-joints and allow a direct connection between the steering wheel and steering rack. Suspension uprights were designed to be compatible on both sides of the vehicle.

Our team would like to thank our incredible sponsors and the volunteers that made this competition possible.



**BRAKE :** Outboard hub mounted floating rotor  
**BSCD :** 95mm, 63.4mm, 1, 449cc  
**COOLING :** Rear mounted 228.6 x 254mm core aluminum radiator w/ 625cfm fan  
**DRIVE :** 520 chain drive, 5 speed gearbox, Drexler differential  
**ELECTRONICS :** AEM EMS4 ecu  
**ENGINE :** Yamaha WR-450f  
**FR/RR TRACK :** 1219 mm (48") / 1168 mm (46")  
**FRAME :** 1" 4130 Chromoly Spaceframe, GTAW with ER70-S2 filler  
**FUEL SYSTEM :** AEM controlled EFI, in-tank fuel pump  
**FUEL TYPE :** Gasoline, 93 Octane  
**MATERIAL :** Carbon fiber body panels  
**OLWH :** 2413 mm (95"), 1397 mm (55"), 1041 mm (41")  
**SUSPENSION :** Unequal length double a-arm, pull rod actuation in upright  
**TIRE :** 18x6-10, 18x7.5-10 R25B  
**UNIQUE :** All 2 force member suspension linkages  
**WEIGHT :** 550 lb  
**WHEELBASE :** 1727 mm (68")

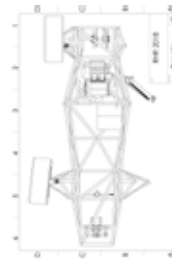
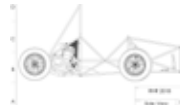


## University of Massachusetts - Lowell

### River Hawk Racing



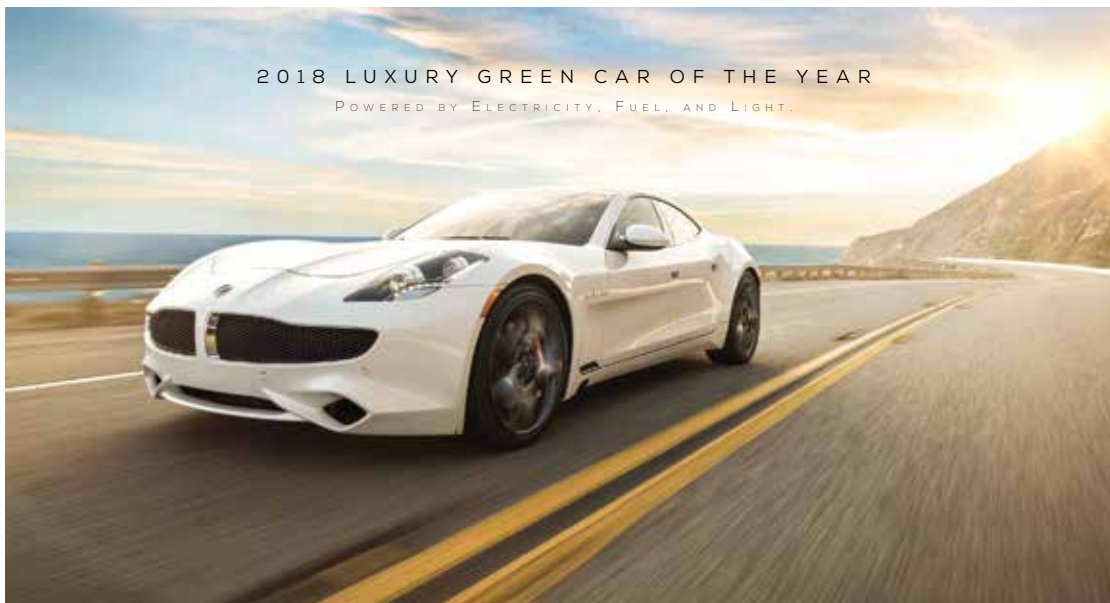
For the second year in a row, River Hawk Racing will be competing in a FSAE competition. The 2017-2018 car is a completely new design using information and experience the team gained by competing in Michigan in 2017. The team was restructured in preparation for the 2018 competition. Reliability, simplicity, driver ergonomics, and ease of manufacture were focuses for the team this year, resulting in a car that could be designed and built more quickly than the previous year.



**BRAKE :** 3-Disk System, adjustable brake balance  
**BSCD :** 83.0mm/60.0mm/2 cylinders/649cc  
**COOLING :** Side Mounted, Single Core, Rear Mounted Fan  
**DRIVE :** Spool, 520 Chain  
**ELECTRONICS :** Microsquirt  
**ENGINE :** Kawasaki EX650F  
**FR/RR TRACK :** 750 mm / 30 in - 611 mm / 24 in  
**FRAME :** 4130 Chromoly  
**FUEL SYSTEM :** Modified OEM  
**FUEL TYPE :** 93  
**MATERIAL :**  
**OLWH :** 2565 mm/101 in  
**SUSPENSION :** Direct actuation, uneven length a arms  
**TIRE :** Hoosier r25b - 20.5-7.5-R13  
**UNIQUE :** Custom data acquisition system and bar tap shifter  
**WEIGHT :** 700 lb  
**WHEELBASE :** 1650 mm / 65 in



United States



THE REVERO

BORN IN SOUTHERN CALIFORNIA

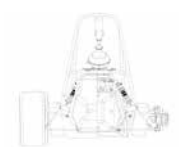
FOR THOSE WHO APPRECIATE THE MOMENTS BETWEEN DESTINATIONS.



# SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

Southern Illinois University is proud to unveil its completely redesigned entry at this year's Formula SAE Lincoln competition. After falling short in the past, Formula SIUE is eager to make a name for itself.

This year, our team went with a complete redesign from prior years to focus on many aspects that previous teams fell short on. The two most important aspects were handling and reliability. We decided to go with a lightweight but rigid space-frame supported by a double a-arm, pushrod actuated, suspension for maximum stability around corners. Simulations with Computational Fluid Dynamics were run on both the intake and exhaust systems to ensure maximum flow and power from our Honda CBR 600RR Engine. Trying to minimize cost, we decided on a modest aerodynamic package that has the ability to accommodate future installations. The driver interface consists of a mechanical paddle shifter mechanism along with an adjustable seat to suit many different drivers. With our new design, we look forward to seeing you at Lincoln.



**BRAKE :** Dynalite Single Piston Calipers  
**BSCD :** 67 mm / 42.5 mm / 4 cyl / 599cc  
**COOLING :** Twin Single Pass Radiators  
**DRIVE :** Chain Drive  
**ELECTRONICS :** Lithium Ion Battery, Z-Fi Fuel Controller  
**ENGINE :** Honda CBR600RR  
**FR/RR TRACK :** 1219mm / 1180mm  
**FRAME :** 4130 Steel Spaceframe  
**FUEL SYSTEM :** Honda CBR600RR Injectors, Aluminum Gas Tank  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** Steel, Aluminum, Plastic  
**OLWH :** 2642mm , 1474mm , 1217mm  
**SUSPENSION :** Pushrod  
**TIRE :** 20.0x7.5-13  
**UNIQUE :** Mechanical Paddle Shifters  
**WEIGHT :** 665lb  
**WHEELBASE :** 1600mm

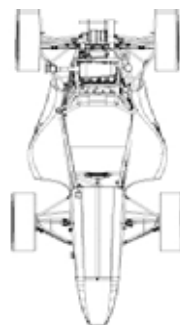


The team of WWU Racing from Western Washington University is proud to announce Viking 59. The 2018 team is bringing back the tradition of WWU Racing taking a car to competition every year. This will be WWU's 17th Formula SAE car.

The focus for 2017/2018 was to streamline our manufacturing process and iterate on reliable parts used on previous Viking cars. By switching to an optimized steel tube chassis, the team was able to build all new parts during the manufacturing phase, allowing the previous car to stay intact and be used as a test bed for Viking 59. This also became a year of establishing baselines and team building for WWU Racing, along with designing and manufacturing a new car. This was done with a detailed master model in CATIA V5, an AiM data acquisition system, proper documentation of new parts, and proper team management to create a new legacy for WWU Racing.

This year's group hopes to make Viking 59 the car and the team that sets the standard for all WWU Racing teams in the future. WWU Racing would like to thank all of its sponsors, friends, family, and the WWU Engineering & Design Department for their support.

For more details, please visit [wwuracing.com](http://wwuracing.com)



**BRAKE :** Tilton 78 Series Master Cylinders, Wilwood Calipers: GP 200 Front, PS1 Rear  
**BSCD :** 67.0mm X 42.5mm, 4 Cyl, 599cc  
**COOLING :** Side Mounted 25.4 mm Core Aluminum Radiator, 1730 cfm Fan, Carbon Shroud  
**DRIVE :** Chain Driven, Torsen Differential, Taylor Race Axles, 3.58 Final Drive Ratio  
**ELECTRONICS :** Custom Megasquirt-III based ECU/PDM, Sequential Fuel/Spark, AiM Evo5 Logger  
**ENGINE :** Honda CBR 600RR  
**FR/RR TRACK :** Front: 1308mm/51.5 in, Rear: 1219mm/48.0 in  
**FRAME :** Space Frame 4130 Chromoly Steel  
**FUEL SYSTEM :** Sequential Port Injection, 200cc Injectors  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** 4130 Chromoly Steel Farnce, Carbon Fiber Body Panels, Aluminum Shielding  
**OLWH :** Length: 2642 mm/104.0 in, Width: 1524 mm/60 in, Height: 1105 mm/43.5 in  
**SUSPENSION :** Short/Long Arm, Push/Pull, Rocker Actuated Air Damper  
**TIRE :** 20.5 X 7 R25B Hoosier  
**UNIQUE :** Custom Center Lock Nuts, Custom Steering Wheel with Embedded Dash  
**WEIGHT :** 645 lbs  
**WHEELBASE :** 1613 mm/63.5 in

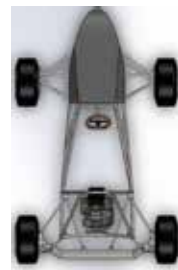






For the 2018 competition year, Formula SAE at the University of Texas at San Antonio improved on the systems from the previous year, continuing the design philosophy of minimalism that suits the strength of the team as a whole. With that said, our philosophy encompasses the idea of “minimal and powerful,” which does translate into cut corners, but, rather, utilizes resourcefulness. Refinements were made with a focus on being weight conscious, optimizing suspension performance, and ensuring reliability.

Our unique vehicle design, utilizing a rear 4-link De Dion beam and unequal, non-parallel dual A-arm front suspension, single cylinder 450cc powertrain, and upright seating position embodies our desire to incorporate experience with new, stand out from the field, and climb to the top.



**BRAKE** : Front: Outboard; Rear: Single Inboard  
**BSCD** : 96mm/62.1mm/1/449cc  
**COOLING** : Water cooled, mechanical pump  
**DRIVE** : Rear wheel chain with Limited slip  
**ELECTRONICS** : AEM Infinity 6 EMS  
**ENGINE** : KFX450R  
**FR/RR TRACK** : 1138mm/49in, 1168mm/46in  
**FRAME** : Mild Steel space frame  
**FUEL SYSTEM** : Electronic fuel injection  
**FUEL TYPE** : 100 octane  
**MATERIAL** : Steel  
**OLWH** : 2718mm/107in, 1453mm/57in, 1118mm/44in  
**SUSPENSION** : Rear: 4-Link De Dion beam; Front: Unequal, unparallel, dual A-Arm  
**TIRE** : 18x8.5x10 Hoosier R25B  
**UNIQUE** : Electro-Pneumatic Shifters  
**WEIGHT** : 550  
**WHEELBASE** : 1549mm/61in



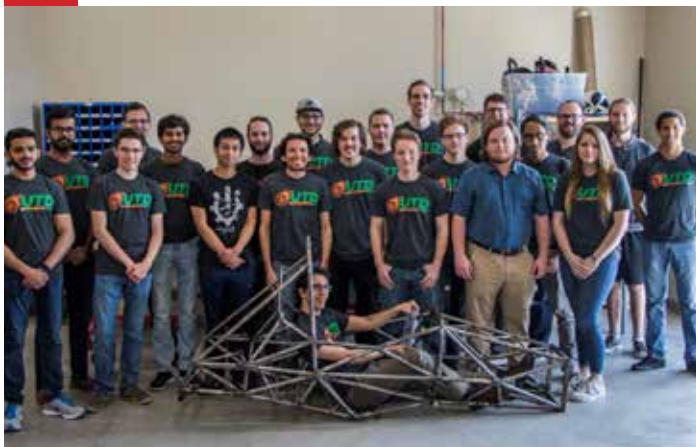
**SIEMENS**  
*Ingenuity for life*

## Design your future.

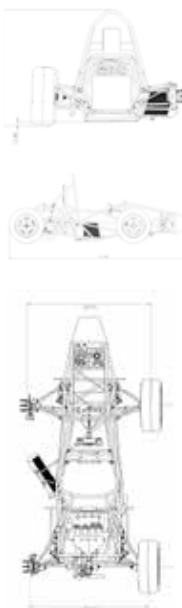
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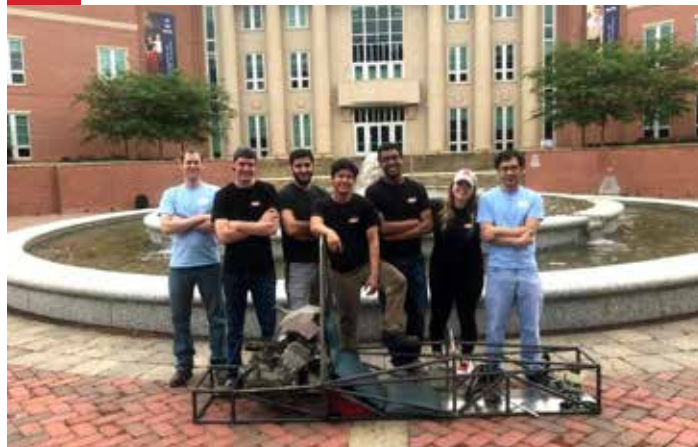
Being a first year team, we aimed for a reasonable performing car that would be reliable and easy to produce. Our design philosophy was to design components as lightweight as possible with extensive verification in FEA simulation. CNC aluminum components were used for the suspension to allow greater freedom for weight optimization and better geometric accuracy when manufactured. 3D printing technologies were used in our design for both prototyping and production parts, most notably on the intake manifold and steering wheel. 3D printing these parts allowed us to achieve great ergonomic comfort in the steering wheel and smooth, symmetric geometry in the intake manifold. Where purchased parts were used (steering rack, dampers, ECU) quality, reliability, and adjustability were the main deciding factors in our selection. The Honda CBR600 F4i engine was selected for its low cost and wide support in Formula SAE. The engine was left largely unmodified, with only changes to intake, exhaust, and cooling systems. Overall the majority of design effort was focused on chassis and suspension, attempting to develop a solid vehicle platform for future years to build upon.



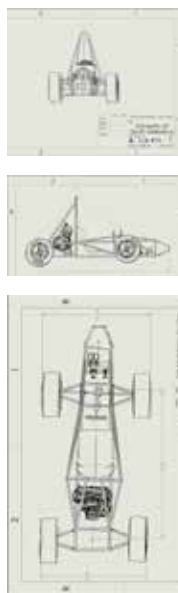
**BRAKE :** Disk brakes, 2 piston calipers front and rear  
**BSCD :** 67mm/42.5mm/4 cyl/599cc  
**COOLING :** Water cooled, side mounted radiator  
**DRIVE :** 520 Chain driven  
**ELECTRONICS :** PE3-8400 A ECU w/ Data acquisition  
**ENGINE :** Honda CBR 600 F4i, Naturally aspirated  
**FR/RR TRACK :** 50 inch front, 48 inch rear  
**FRAME :** 4130 Chromoly steel space-frame  
**FUEL SYSTEM :** Electronic port injection  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** 4130 Steel, 7075 Aluminum  
**OLWH :** L: 11.28 inch, W: 57 inch, H: 41.83 inch  
**SUSPENSION :** Double A-arm, pull rod  
**TIRE :** 21x7.0 Goodyear D2704 Tire  
**UNIQUE :** Data acquisition, wireless telemetry, 3D printed intake manifold  
**WEIGHT :** 625lb  
**WHEELBASE :** 65 inch



United States



The University of South Alabama Jaguar Racing Team is competing in their first ever SAE competition. This team has been in operation for three years. Two of these years have been spent financing the team, gaining knowledge about the competition and presenting feasibility reports to the faculty at the University of South Alabama. The team's goal and mission is to advance the knowledge and education of students both on a local and national level who express interest in the automotive industry. Participating in competitions every year will provide its members with valuable engineering and team building experience. This allows the involved students to use what they have learned in the classroom and apply it in a real world application.



**BRAKE :** hydraulic disc brakes using organic braking pads  
**BSCD :** 2.64 in x 1.67 in / 4 / 4 / 599 cc  
**COOLING :** liquid cooling  
**DRIVE :** chain to differential  
**ELECTRONICS :** ECU is microsquirt 3  
**ENGINE :** 2003 Honda CBR 600 F4i  
**FR/RR TRACK :** 25.0 inches  
**FRAME :** A513 mild steel with a space frame design  
**FUEL SYSTEM :** direct fuel injection  
**FUEL TYPE :** E85  
**MATERIAL :** steel frame, aluminum body  
**OLWH :** 95-100 in / 51.0 in / 48 in  
**SUSPENSION :** push rod and bell crank type  
**TIRE :** 20.5 x 6 -13  
**UNIQUE :** turbo charged  
**WEIGHT :** 475-525  
**WHEELBASE :** 70.0 in



United States



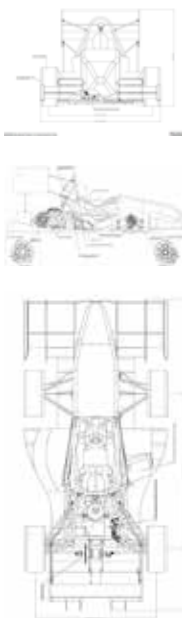
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## North Carolina State University - Raleigh

### Wolfpack Motorsports



Wolfpack Motorsports would like to present WMF-18. This year's car features an optimized tubular steel space-frame chassis. Our suspension features carbon-fiber tube construction. The aero package is more aggressive, adding more downforce. This car features a custom steering rack, custom carbon fiber steering wheel, and electronic shifting. The car is powered by a Honda CBR 600 F4i motor with custom intake and exhaust systems. The car also features a dual radiator setup thanks to AKG.



**BRAKE :** AP Racing Calipers, Tilton Master Cylinders, Floating Rotor  
**BSCD :** 66mm/43mm/4cyl/599cc  
**COOLING :** Dual side mount radiators  
**DRIVE :** Chain  
**ELECTRONICS :** MoTeC M400 and ADL  
**ENGINE :** Honda CBR 600 F4i  
**FR/RR TRACK :** 1245mm/1219mm (49/48 inches)  
**FRAME :** Tubular steel spaceframe  
**FUEL SYSTEM :** Fuel Injection  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** 4130 chromoly steel  
**OLWH :** 2966mm (116.8in), 1433mm (56.4in), 1109mm (43.7in)  
**SUSPENSION :** Unequal length composite A-Arms, Pullrod Front, Pushrod Rear  
**TIRE :** 18.0" x 7.5" Hoosier R25B  
**UNIQUE :**  
**WEIGHT :** 600 lb w/ 150 lb driver  
**WHEELBASE :** 1549mm (61 inches)



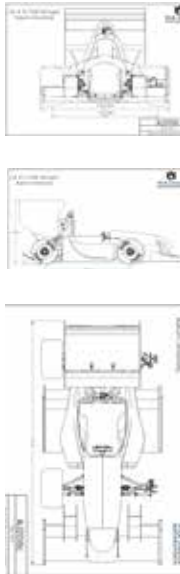
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## Auburn University

### War Eagle Motorsports



AU-2018c was designed with two primary goals in mind: lightweight and reliable. Building on the hybrid monocoque/steel space frame platform that has been a staple of the team since 2012, we have been able to optimize the chassis to be the lightest version the team has ever designed. A custom gearbox and the utilization of E85 fuel will help get even more power out of our Yamaha R6 motor. Furthermore, by utilizing resin infusion in our composites manufacturing, we were able to make composites parts even lighter and stronger.



**BRAKE :** Floating Rotor, Adjustable Bias  
**BSCD :** 67.0, 42.5, 4, 599  
**COOLING :** Dual sidepod-mounted, single-pass radiators  
**DRIVE :** Chain Drive, Spool  
**ELECTRONICS :** MoTeC Electronics, Wireless Telemetry, Steering Wheel Display, Bosch ETC  
**ENGINE :** Yamaha R6  
**FR/RR TRACK :** 1194/47/1194/47  
**FRAME :** Hybrid CFRP Monocoque, Steel Spaceframe  
**FUEL SYSTEM :** In-Tank Pump, Port Injection  
**FUEL TYPE :** E85  
**MATERIAL :** Various  
**OLWH :** 2888/113.7/1439/56.67/1167/45.96  
**SUSPENSION :** SLA  
**TIRE :** Hoosier 18.0 x 7.5-10, R25B  
**UNIQUE :** Ask us in the paddock!  
**WEIGHT :** 553 lbs  
**WHEELBASE :** 1530/60.25

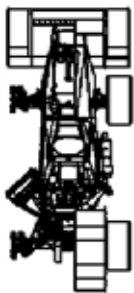






Western Formula Racing is the FSAE team from Western University in London, Ontario, Canada. Beginning in 1988, we've competed every year since 1996. The team has a philosophy of Excellence, Endurance, and Enthusiasm: building highly skilled and effective professionals; ensuring the long term success of the team; and having fun!

In our 30th year, we are continuing to push the boundaries of our capabilities in design, manufacturing and testing. WFR-18 features multiple new and improved composite components including three-piece carbon fiber wheels, carbon fiber driveshafts, and carbon fiber monocoque. We also pride ourselves on our world class ergonomic package. An all new lap simulator has helped our team make high level design decisions to maximize vehicle performance. We continue to use 9" wide tires and multi-plane front and rear wings for increased grip. WFR-18 has also adopted an all new Motec ECU, allowing the team to explore different aspects of engine control. Restructuring of the electrical and cooling design will help to maximize this years reliability. With this design, it is believed that WFR-18 will be bringing the best overall package to the track this year.



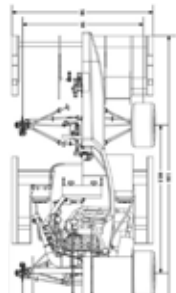
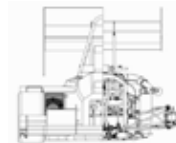
**BRAKE :** Floating rotors  
**BSCD :** 67/42.5/4/599  
**COOLING :** Side-mounted aluminum radiator  
**DRIVE :** Chain  
**ELECTRONICS :** Motec M150  
**ENGINE :** Honda CBR600 F4i  
**FR/RR TRACK :** 1050/1035  
**FRAME :** CFRP Monocoque  
**FUEL SYSTEM :** Fuel injected  
**FUEL TYPE :** 93 Octane  
**MATERIAL :**  
**OLWH :** 2970/1304/1194  
**SUSPENSION :** Double unequal length wishbone  
**TIRE :** Hoosier R25B 20x9-13  
**UNIQUE :** Single shot infusion monocoque; 35% of vehicle width is rubber  
**WEIGHT :** 275kg  
**WHEELBASE :** 1525



State Racing is proud to present our latest car, the SR-18. Featuring the time-tested Honda CBR 600 RR and hybrid monocoque-space frame design, the SR-18 is a high performance vehicle and maintains high standards in reliability and serviceability. The SR-18's characteristic track width allows it to reach higher lateral acceleration than any prior State Racing vehicle and allows for additional downforce from increased aero span. Over 50 sensors are integrated to monitor the vehicle and driver performance via real time telemetry and data logging technologies. This data is then analysed to tune the car for optimal performance and, as always, will be used in the development of future vehicles. Additionally, the SR-18 features electro-pneumatic paddle shifting, traction control, and launch control.

Thanks to the support of Michigan State University and all our sponsors, the SR-18 has shaped up to be our fastest car yet.

Go Green, Go White, Go Fast.



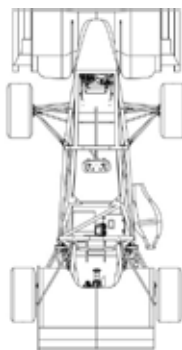
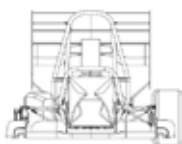
**BRAKE :** ISR 22-048 OB front, Brembo P2.24 Rear  
**BSCD :** 67mm / 42.5mm / Inline 4 cyl / 599 cc  
**COOLING :** 2 Side Mounted 25.4mm core Aluminum Radiators  
**DRIVE :** Chain-Driven Drexler Differential  
**ELECTRONICS :** Motec M400 with Bosh C50  
**ENGINE :** Honda CBR 600 RR  
**FR/RR TRACK :** 1270mm/1270mm  
**FRAME :** Hybrid (¾ Monocoque front, Tubular space frame rear)  
**FUEL SYSTEM :** Sequential fuel injection  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** Carbon Fiber, Steel, Aluminum, Magnesium, Titanium  
**OLWH :** 2730mm, 1472mm, 1200mm  
**SUSPENSION :** Double unequal length A-Arm, Push-rod actuated  
**TIRE :** Hoosier 18 x 6-10 LC0  
**UNIQUE :**  
**WEIGHT :** 565 lb  
**WHEELBASE :** 1537mm





The main objective for Kettering University Formula SAE's 2018 season was to develop a highly capable vehicle that is competitive in all aspects of the competition. Upon competing with and testing the 2017 vehicle, the team drafted a set of performance metrics and design objectives that would yield exceptional results. Backed by design analysis and additional research, the overall vehicle goals include: maintaining a vehicle mass less than 165 kg, improving vehicle dynamics and drivability, achieving greater powertrain efficiency, and a more efficient aerodynamic package. Additional emphasis was also placed on vehicle cost and fuel efficiency without sacrificing vehicle performance.

Kettering University Motorsports would like to thank Kettering University and all the faculty members who have helped us throughout the year. We would also like to extend a very special thank you to all of our sponsors who have supported us this year. Without your help we would not be able to compete each year.



**BRAKE :** Mild Steel Floating Rotors, Tilton MC, Willwood (FR)/AP Racing (RR) Calipers

**BSCD :** 3.82 in/2.39 in/1 Cylinder/27.5 cu in

**COOLING :** Raptor 660 Radiator

**DRIVE :** Chain Driven, Drexler Differential

**ELECTRONICS :** Woodward SECM 70, Bosch DDU9 Logger/Display

**ENGINE :** Yamaha WR450f

**FR/RR TRACK :** (1206mm/47.5") (1187mm/47")

**FRAME :** 1018 Mild Steel Space Frame with structural composite floor

**FUEL SYSTEM :** Relatively-Low-Pressure EFI

**FUEL TYPE :** E85

**MATERIAL :** Steel, Aluminum, Carbon Fiber

**OLWH :** (2840mm/111.8" long)(1416mm/55.75" wide) (1099mm/43.25" tall)

**SUSPENSION :** Double SLA with Pull Rod Front and Push Rod Rear

**TIRE :** 18x6.0x10 Hoosier LCO

**UNIQUE :**

**WEIGHT :** 500 lbs

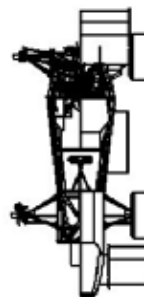
**WHEELBASE :** 1560mm/61.5"



United States



7 years of development and know-how on RoseGPE brings forth RGP007. To help set targets and make smarter decisions, a custom laptime simulation package was developed. The YFZ450R is both light and packs a punch thanks to a Garrett MGT12 turbocharger. The fully-custom electronics system features a full CAN bus, electronic fusing, LCD panel display, and fully waterproof modules. Electronic clutch, shifting, and ARB systems keep the driver's hands on the wheel and their eyes on the prize. A CFD-simulated aero package keeps the tires working on the corners, and the steel spaceframe with carbon fiber bonded sidepanels boosts stiffness while keeping the car easy to modify and work on. With inboard braking, Ohlin shocks, integrated drivetrain-engine mounting, carbon fiber rims, optimized uprights, all the details have been considered to bring weight to a minimum.



**BRAKE :** Stopping distance: 19.25m at 24.5m/s, inboard rear

**BSCD :** 95mm/63.4mm/1/450cc

**COOLING :** Electric water pump and fan

**DRIVE :** Chain drive

**ELECTRONICS :** Custom CAN bus and PCBs, PE3 ECU

**ENGINE :** YFZ450R

**FR/RR TRACK :** 1219 mm/1194 mm

**FRAME :** 4130 Steel tube frame

**FUEL SYSTEM :** Electronic fuel injection

**FUEL TYPE :** 100 Octane

**MATERIAL :** Carbon fiber wings and body

**OLWH :** 2755mm, 1422mm, 1199mm

**SUSPENSION :** Pullrod front, pushrod rear. Double wishbone

**TIRE :** 6.0/18.0-10" Hoosier LCO

**UNIQUE :** Electronic fusing, custom LCD dash, boot-loader, carbon fiber reinforced frame

**WEIGHT :** 540 lbs

**WHEELBASE :** 62 in

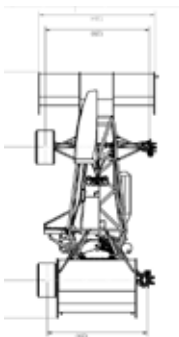
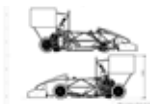
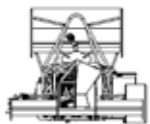


United States





LSU TigerRacing has grown into an even larger team. This year the team took on a couple drastic changes to our car compared to last year. This is the first year we have an aero package on the car as part of a Sr design project. We also switched to 10" wheels (previous Sr design) running the new low profile Hoosier tire. The last major change is the engine swap from a Honda to the Yamaha. Through these changes the team hopes to leave a great platform for the next couple of years as we continue to design lighter parts and improve performance.



**BRAKE :** Floating 4130 rotors, Tilton Master Cylinders, Wilwood Front, AP racing Rea  
**BSCD :** 67mm x 42.5mm, 4 cyl, 599cc  
**COOLING :** Mezzo Microtube Radiator, Electric Water Pump  
**DRIVE :** Drexler Limited Slip, Chain Drive, Sequential 4 Speed  
**ELECTRONICS :** Performance Electronics Stand Alone ECU, AiM Evo5, 2-Step, Traction Control  
**ENGINE :** Modified Yamaha YZF-R6  
**FR/RR TRACK :** 1250mm, 1200mm  
**FRAME :** 4130 Space Frame  
**FUEL SYSTEM :** Fuel Injected, Inline Pump  
**FUEL TYPE :** Gasoline, 100 Octane  
**MATERIAL :**  
**OLWH :** 2956mm, 1460mm, 1200mm  
**SUSPENSION :** Unequal Length A-Arm, Pull Rod Front, Push Rod Rear, Ohlin Dampers  
**TIRE :** Hoosier 16x7.5R10 R25B  
**UNIQUE :** Unequal Length A-Arm, Pull Rod Front, Push Rod Rear, Ohlin Dampers  
**WEIGHT :** 263kg (580lbs)  
**WHEELBASE :** 1600mm



The University of Toledo's 2018 Formula SAE car, UTR-24, marks the 24th year for the team. This year the team set out to build a reliable, 10" wheel, single cylinder, space-frame with multiple adjustment options and data acquisition validation. After last year's competition and achieving our goal of switching engines, we aimed our focus more towards the performance and reliability of the car and the performance of the drivers. To obtain this goal a strict timeline was followed that allowed for a finalized design before any production started. This eliminated all afterthoughts allowing for ease of manufacturing, improved vehicle integration, and more time available for tuning the car, training the drivers, and increasing reliability. To achieve our top priority of maximizing quality testing time, a detailed test plan was introduced alongside our data acquisition. This assured the team that all the time spent in the car would be used for advancing the performance of the car and drivers.



**BRAKE :** Brembo Billet Calipers (F), Wilwood PS1 Calipers (R)  
**BSCD :** 95mm/63.4mm/1/450  
**COOLING :** Center Mounted Double Pass Heat Exchanger  
**DRIVE :** Chain  
**ELECTRONICS :** Motec M150, Motec L180  
**ENGINE :** KTM 450 -SF-X  
**FR/RR TRACK :** 1574.8mm/1257.3mm  
**FRAME :** 4130 Steel Spaceframe  
**FUEL SYSTEM :** Port Injection  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** 4130 Steel  
**OLWH :** 2933.7mm, 1435.1mm, 1215.1mm  
**SUSPENSION :** Non-Parallel Unequal Length Anti Dive(F), Double Wishbone (R)  
**TIRE :** 7.5/16.0-10.0 Hoosier LCO  
**UNIQUE :** Pneumatic Paddle Shifters, Driver Adjustable Anti-roll Bar  
**WEIGHT :** 550 lbs  
**WHEELBASE :** 1574.8mm







## University of North Florida Osprey Racing



Osprey Racing is proud to present its seventh production car, the Swoop D7. The SD7 builds on the reliability found in the previous SD6 generation with extensive testing focusing on design validation and performance tuning. SD7 is powered by a Motec-controlled Honda CBR-600RR. A modified 4-speed transmission with pneumatic shifting delivers 86 horsepower to 13"-wheels.

We'd like to thank our friends, families, sponsors, and the university for their continued support and giving us the amazing opportunity to compete.

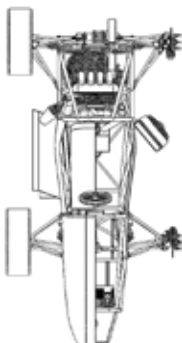
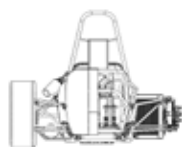


## San Jose State University Spartan Racing

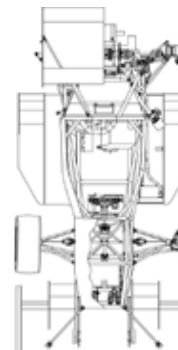
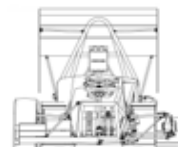


SR10 marks the Tenth consecutive year anniversary for San Jose State University's Spartan Racing Formula SAE Team. SR-10 features a redesigned aerodynamics package, 10in Hoosier tires on magnesium OZ wheels, and a 4130 steel tube space frame. Powered by a Triumph 675 Daytona 3-cylinder engine running on E-85 controlled by a MoTeC M150 ECU,

Spartan Racing would like to thank all of our sponsors, family, friends, and alumni for their continued support!



**BRAKE :** Four floating 4340 rotors; Tilton 77 Series Master Cylinders  
**BSCD :** 67mm // 42.5mm // 4 // 599cc  
**COOLING :** Single side-mounted single-core radiator  
**DRIVE :** 520 Chain-driven limited slip  
**ELECTRONICS :** Motec N150 ECU w/ clutchless shifting  
**ENGINE :** Honda CBR-600RR  
**FR/RR TRACK :** 48in./1219mm // 47in/1194mm  
**FRAME :** 4130 Chromoly Spaceframe  
**FUEL SYSTEM :** Low Pressure Multipoint Port Fuel Injected Return System  
**FUEL TYPE :** 93  
**MATERIAL :** Carbon Fiber Bodywork and Cockpit  
**OLWH :** 106in./2692mm; 55in./1397mm; 42.5in./1080mm  
**SUSPENSION :** Pull Rod Front; Push Rod Rear  
**TIRE :** 20.5in. x 7in. x 13in.; R25B  
**UNIQUE :** Modified 4-speed transmission  
**WEIGHT :** 605lb  
**WHEELBASE :** 62 inches/1575mm



**BRAKE :** Tilton 78 Series MC, Wilwood GP200 Calipers  
**BSCD :** 77mm/52.3mm/3/675cc  
**COOLING :** Dual Sidepod Mounted Radiators  
**DRIVE :** Chain Driven Drexler Limited Slip Differential  
**ELECTRONICS :** MoTeC M150 ECU, MoTeC L180 DAQ  
**ENGINE :** Triumph 675 Daytona  
**FR/RR TRACK :** 48in/47in  
**FRAME :** 4130 Steel Space Frame  
**FUEL SYSTEM :** Single-rail EFI, Return Type  
**FUEL TYPE :** E85  
**MATERIAL :** 4130 Steel, Carbon Fiber, 3D Printed ABS, Aluminium  
**OLWH :** 115in, 56in, 51in  
**SUSPENSION :** Pull-Rod Front, Push-Rod Rear, Öhlins Shocks  
**TIRE :** 18x7.5x10 Hoosier R25B  
**UNIQUE :** Custom 4-Stage Oil Pump, Custom Variable Cam Timing  
**WEIGHT :** 570lbs  
**WHEELBASE :** 60,25in

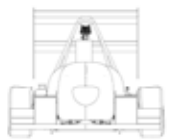


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## Northwestern University Northwestern Formula Racing



The 2018 Northwestern Formula SAE Team is competing in Formula SAE, Michigan for the 6th consecutive year. Performance, weight reduction, and handling were chosen as specific areas of improvement for this year's entry. As a team this year, we focused our attention on powertrain and suspension, tailoring our design decisions in a way that adapts to the implementation of a new engine. This focus demonstrates our commitment toward drivability, the structural integrity of the vehicle, and our design goals for the 2018 year.



**BRAKE :** Brembo  
**BSCD :** 65.5/44.5/4/600  
**COOLING :** Water \*distilled  
**DRIVE :** Chain, Drexler LSD  
**ELECTRONICS :** MoTeC M400  
**ENGINE :** Yamaha R6  
**FR/RR TRACK :** 48/48 inches  
**FRAME :** Space Frame  
**FUEL SYSTEM :** Gasoline  
**FUEL TYPE :** 93  
**MATERIAL :** Assorted  
**OLWH :** 3000/1450/1200  
**SUSPENSION :** A-arms, push and pull, Ohlins TTX25  
**TIRE :** 10" Rubber  
**UNIQUE :**  
**WEIGHT :** 600  
**WHEELBASE :** 60"



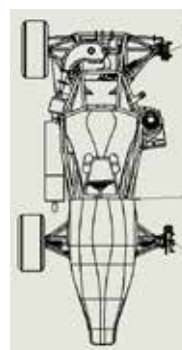
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## University of Cincinnati Bearcat Motorsports



Bearcat Motorsports (BCMS) is set out to compete at the highest level possible. The team has iteratively developed a racecar by pushing the limits of previous team designs. The vehicle is capable of scoring at least 715 points and finishing the endurance event with a placement in the top 15 at the 2018 FSAE Michigan competition.

Bearcat Motorsports has stayed true to its' philosophy of evolution over revolution. The main approach this year was to first evaluate the previous year's model and improve upon unfortunate failures in last year's competition. This allows the BCMS team to produce a predictable vehicle with the same competitive attributes. The 2018 FSAE competition puts a greater emphasis on design and less on endurance this year which is why we have been diligently studying the simulation data and double checking that the car was done right. Studies were completed to understand what would make a vehicle competitive during the 2018 FSAE Michigan competition. From these analyses, the team's event goals were created. To get this far, our team has made great strides together with limited team members and worked efficiently to make this car Bearcat Strong!



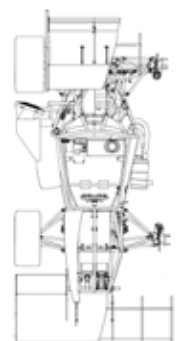
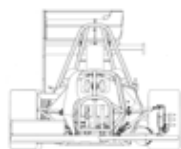
**BRAKE :** Floating rotors, AP Racing master cylinder, 25mm bore calipers, DeFigo pads  
**BSCD :** 98mm Bore / 63.4mm Stroke / 1 cyl / 478cc  
**COOLING :** Mishimoto Kawasaki KFX700, 8 dia x 2400 cfm fan mounted  
**DRIVE :** Chain Drive, 520 Pitch, Taylor Race MK2 Quaife ATB, 2:1 bias  
**ELECTRONICS :** PE3 ECU, MoTec L180/Wireless Comm., Anti-gravity Li Ion Battery,  
**ENGINE :** Yamaha YFZ450R  
**FR/RR TRACK :** F: 1118 R: 1080  
**FRAME :** Steel Space Frame, 1020 DOM Steel  
**FUEL SYSTEM :** Stock YFZ450R injector  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** Steel, Aluminium, Titanium, Carbon Fiber, Plastic  
**OLWH :** Length: 2612mm / Width: 1321mm / Height: 1067 mm  
**SUSPENSION :** Unequal length wishbones, Direct Acting Dampers  
**TIRE :** Length: 2612mm / Width: 1321mm / Height: 1067 mm  
**UNIQUE :**  
**WEIGHT :** 550lb  
**WHEELBASE :** 1556mm





Gopher Motorsports presents the Go4-18c, a car that builds upon its predecessors and was designed with the ultimate goal of maximizing the points-earning potential of the team at competition. The Go4-18c boasts new designs that include a rear wing drag reduction system, a paddle shifting system, as well as improvements to the car's ergonomics and suspension setup. Improvements to the electronics system include a second student-designed printed circuit board, and the engine's cooling system has been vastly improved.

Gopher Motorsports would like to thank the University of Minnesota as well as our many industry sponsors for their continued support of the team. Their generous donations of time, products, and funding have allowed the team to continue our upward trajectory of success at competition.



**BRAKE :** Custom rotors, Tilton MC, Brembo calipers  
**BSCD :** 65.5mm/44.5mm/4/600cc  
**COOLING :** Side mounted radiator w/fan  
**DRIVE :** Modified transmission, chain drive, TRE differential  
**ELECTRONICS :** MoTeC M600 and EDL3, student-designed power distribution  
**ENGINE :** Yamaha 2003-2005 YZF R6  
**FR/RR TRACK :** 1232/1194mm, 48.5/47.0in  
**FRAME :** Steel space frame w/bonded carbon sandwich panels  
**FUEL SYSTEM :** Custom fuel rail, returnless system, dual cone injectors  
**FUEL TYPE :** 93 Octane  
**MATERIAL :** 4130 steel, carbon fiber/Nomex sandwich panels  
**OLWH :** 3048/1463/1195mm, 120.0/57.6/47.0in  
**SUSPENSION :** Unequal length a-arms; pullrod front, pushrod rear  
**TIRE :** Front: Hoosier 20.0x7.5-13 R25B, Rear: Hoosier 20.0x9.0-13 R25B  
**UNIQUE :** Paddle shifting, drag reduction system, student-designed muffler  
**WEIGHT :** 281kg, 620lb  
**WHEELBASE :** 1600mm, 63in

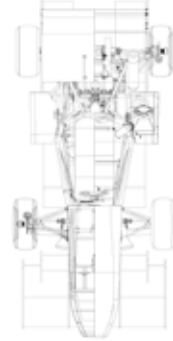
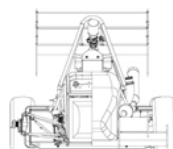


Formula CEFEST team introduces the ES-09. This project main goals were to reduce mass and increase the dynamic performance when compared to the team's last prototype.

This way, the wheel's rim were reduced from 13" to 10"; the data acquisition systems were upgraded to gather new information to validate mathematical and computational models; and there were performed planned dynamic tests to calibrate setups and the engine's controls.

FSAE Brazil 2017 results:

1st place - AutoCross  
 1st place - Acceleration 4.052s  
 2nd place - Design Event  
 3rd place - Business Presentation



**BRAKE :** AISI 420 Stainless steel/ Wilwood Compact Remote Reservoir Master Cylinder  
**BSCD :** 67mm/ 42.5mm/ 4 / 599cc  
**COOLING :** Single side mounted 301x194 mm core dimensions radiator 217,27 cm fan mounted  
**DRIVE :** Chain Drive  
**ELECTRONICS :** Megasquirt MS3X/ AIM EVO IV - G-DASH Display/ Team designed electronics  
**ENGINE :** CBR600RR  
**FR/RR TRACK :** 1220mm (48")/ 1175mm (46")  
**FRAME :** Stainless Steel Tubular Frame  
**FUEL SYSTEM :** Electronic Controlled Fully Sequential Injection  
**FUEL TYPE :** 93  
**MATERIAL :** Steel, Aluminium, Glass and Carbon Fibers  
**OLWH :** 2936mm/1245mm/1190mm  
**SUSPENSION :** Double unequal A-arms/ FOX DHX-RC4  
**TIRE :** Hoosier 10" LCO  
**UNIQUE :** Custom electronic modules and instrumentation, Electro-pneumatic shifting  
**WEIGHT :** 215kg (473lb)  
**WHEELBASE :** 1540mm (60")

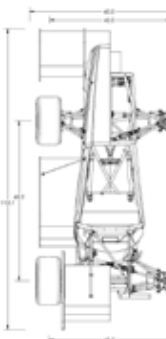
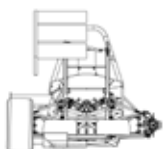






Penn Electric Racing presents REV4. REV4 relies on the success of past cars while simultaneously undergoing substantial redesign. REV4 is Penn Electric Racing's first four-wheel drive car. Design highlights include custom motors, gearboxes, and motor controllers, all housed in-wheel. REV4 also features a redesigned accumulator, pedal tray, and all new electronics.

Thanks to all of our sponsors who have made REV4 possible!



**BRAKE** : Regenerative Braking combined with Outboard Hydraulic single Piston Calipers

**COOLING** : Water Cooled Motors, Motor Controllers; Air Cooled Accumulator

**DRIVE** : Custom Parker Motors

**ELECTRONICS** : Distributed, CAN-based

**EMCAC** : LiMnNiCoO<sub>2</sub> / 6.2 kWh

**FR/RR TRACK** : 1168/1168 mm

**FRAME** : Spaceframe

**MATERIAL** : 4130 DOM Tubing

**MAXMOTORRPM** : 10,000

**MAXSYSVOLT** : 290V

**MOTORCNTRLR** : Custom

**MOTORTYP** : Parker Custom

**NMLMM** : 4 / In-Wheel / 80 kW combined

**OLWH** : 2911 / 1410 / 1187 mm

**SUSPENSION** : Unequal-length unparallel arm, pushrod actuated, U-Shape Adjustable ARB

**TIRE** : Hoosier 18.0/7.5-10, R25B

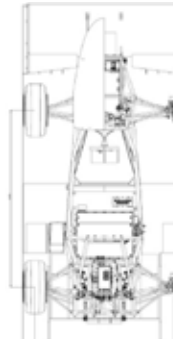
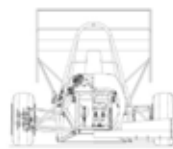
**TRANSRATION** : 8.5:1 In-Wheel Planetary

**WEIGHT** : 272 kg

**WHEELBASE** : 1529 mm



For Model Year 2018, MIT Motorsports sought to build on last year's success and worked towards perfecting a single motor, rear wheel drive, steel space-frame vehicle. MY18 is powered by a custom wound Emrax 228 permanent magnet synchronous motor paired with a Rinehart Motion Systems PM100 DXR motor controller. Our vehicle features a reworked custom-designed accumulator with forced air cooling, introduces control systems such as launch control and fault detection, and includes custom carbon fiber frame panels for increased torsional stiffness. The aerodynamics package features a 45% increase in downforce over MY19, and a pneumatically actuated upper element to decrease drag at high speeds. A primary focus this year was on recruiting and training new members, many of whom have made substantial contributions to this year's vehicle. We are excited to be at Lincoln!



**BRAKE** : Alloy steel floating rotors

**COOLING** : Side-mounted radiator

**DRIVE** : Chain reduction

**ELECTRONICS** : Modular data acquisition system

**EMCAC** : Lithium Cobalt Oxide, 7.1 kWh

**FR/RR TRACK** : 1219 mm (48in)

**FRAME** : Welded spaceframe

**MATERIAL** : 4130 steel

**MAXMOTORRPM** : 5500 RPM

**MAXSYSVOLT** : 300 V

**MOTORCNTRLR** : RMS PM100DXR

**MOTORTYP** : Emrax 228 axial flux synchronous

**NMLMM** : 1, rear, 80 kW

**OLWH** : 2896x1422x1194 mm (114x56x47 in)

**SUSPENSION** : Double unequal a-arm, pushrod

**TIRE** : Hoosier R25B 18x7

**TRANSRATION** : 3.5

**WEIGHT** : 300 kg (660 lb)

**WHEELBASE** : 1524 mm (60 in)



United States



United States

**E203**

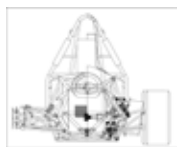
## Universidade Estadual de Campinas Team Unicamp E - Racing



The E2017 prototype was built based on the foundations of the team: simplicity, low mass and reliability. The design has begun by defining the batteries and its container, reconciling high energy and size, once the pack fits the motor.

Then, the mechanical design aimed for the best vehicular dynamics, by reducing unsprung mass and rotational inertia and lowering the center of mass and yaw moment. The suspension kinematics and the chassis rigidity were optimized, while overall mass was reduced without losing reliability.

The electrical design aimed reliability and loss of weight, mainly achieved by replacing wires between sensors for CAN communication. This also enabled the team to easily detect and prematurely act against errors.



**BRAKE** : AISI 420 Floating rotors, Wilwood Calipers  
**COOLING** : Oil cooled motor  
**DRIVE** : Direct Drive, Drexler Differential  
**ELECTRONICS** : Self developed electronics and BMS with CAN communication  
**EMCAC** : LiCoO2 pouch cells, 5.3kWh  
**FR/RR TRACK** : 1190 / 1130 mm  
**FRAME** : Steel Space frame  
**MATERIAL** : AISI 1020  
**MAXMOTORRPM** : 2500  
**MAXSYSVOLT** : 300 V  
**MOTORCNTRLR** : Sevcon  
**MOTORTYP** : YASA 750 / Axial Flux  
**NMLMM** : Single / Rear / 100kW / 750Nm  
**OLWH** : 2853mm, 1405mm, 1097mm  
**SUSPENSION** : Double A-arm, front pullrod actuated, rear pushrod actuated.  
**TIRE** : Front 18x6.0-10 Hoosier R25B / Rear 18x7.5-10 Hoosier R25B  
**TRANSRATION** : Direct drive  
**WEIGHT** : 261 kg  
**WHEELBASE** : 1550 mm



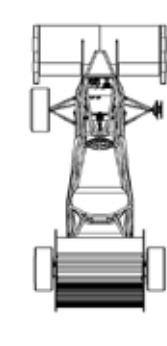
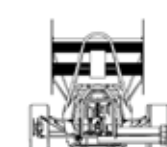
Brasil

**E204**

## Missouri University of Science and Tech Formula Electric



Formula Electric is excited to present our 2018 contender, FE04 "Amelia". Amelia features a completely redesigned suspension and is the first car from Formula Electric to feature a full aero package. The team's goals for this year were to improve data acquisition capabilities, avoid curbs, and complete endurance. We'd like to thank Dr. Hutcheson, Mickey, and all our sponsors for their support over this past year!



**BRAKE** : Front: Wilwood, 1.75" piston, Floating  
 Rear: Wilwood, GP200, 1.25" opposed  
**COOLING** : Water cooling with side-mounted radiator  
**DRIVE** : Rear Wheel Chain Drive  
**ELECTRONICS** : Several  
**EMCAC** : Li-NiMnCoO2/ 5.6 kWh  
**FR/RR TRACK** : 1245mm/1184mm  
**FRAME** : Steel Space Frame  
**MATERIAL** : 4130 Chromoly  
**MAXMOTORRPM** : 5000  
**MAXSYSVOLT** : 210  
**MOTORCNTRLR** : Rinehart Motion Systems, PM100DXR  
**MOTORTYP** : Emrax 228  
**NMLMM** : 1/Rear/80kW  
**OLWH** : 3025mm/1400mm/1323mm  
**SUSPENSION** : Double unequal length A-Arm, Pull rod actuated spring and damper  
**TIRE** : 18x7.5-10 R25B Hoosier  
**TRANSRATION** : 3.75  
**WEIGHT** : 650 lb.  
**WHEELBASE** : 1684mm

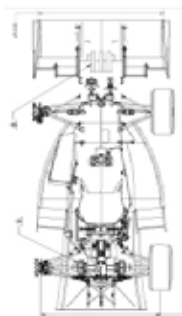
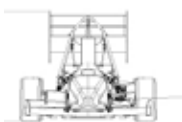


United States





The 2018 UWashingon eCar is a new design, based on the success of electric cars built over the last 5 years and 29 years of combustion vehicle experience. In 2017, we had an eTrain design that functioned well, but was not always reliable. Our focus for 2018 was to design for improved reliability. Multiple changes were made to the 2018 car based on data collected from previous electric cars, and our own analysis. The carbon fiber monocoque chassis was optimised for the electric powertrain, two Emrax 188 motors and gearboxes of our own design. The gearboxes were moved outboard of the chassis, shrinking the rear significantly and saving weight. The suspension has also undergone major overhaul. The front is directly actuated and rear is push rod activated. The low voltage system now runs on 24V allowing for less resistance in the system. Prior to 2018, our team has produced both a combustion and electric vehicle, but we are now focusing all our efforts on constructing a single electric vehicle. This focus on the eCar combined with our prior experience has allowed us to construct a more reliable electric car, manufactured in less time than previous years allowing for more testing time.



**BRAKE** : F: Brembo P234 w/ 7.5" ductile iron rotors. R: Wilwood PS1 w/ 7" Al rotors  
**COOLING** : Aluminum radiator, with liquid-cooled motors and inverter components  
**DRIVE** : Rear-drive with independent motors  
**ELECTRONICS** : 24V LV system  
**EMCAC** : 6061 Aluminum, 6.83 kWhr  
**FR/RR TRACK** : F: 1245mm (49"), R: 1194mm (47")  
**FRAME** : Monocoque  
**MATERIAL** : Carbon fiber with aluminum honeycomb core  
**MAXMOTORRPM** : 5000 rpm  
**MAXSYSVOLT** : 294 V  
**MOTORCNTRLR** : UniTek Bamocar D3-400-400 RS  
**MOTORTYP** : EMRAX 188  
**NMLMM** : 2, 30kW, rear-mounted motors  
**OLWH** : 2915mm (114.8"), 1414mm (55.7"), 1168mm (46.0")  
**SUSPENSION** : Push-rod front and rear  
**TIRE** : F: Hoosier LC0 6.0/18.0-10, R: Hoosier R25B 6.0/18.0-10  
**TRANSRATION** : 3.71:1  
**WEIGHT** : 530 lb  
**WHEELBASE** : 1562mm (61.5")



The design concept for FE5, UC Davis Formula Racing's 2018 car, springs from intent to advance and optimize the validated design of the previous year's car. Based on extensive analysis of each subsystem and competition performance targets, the team has developed a compact, centralized, rigid, and high-performance vehicle package.

Major design goals for our 2018 vehicle were weight reduction, improved thermal management, and enhanced vehicle dynamics, as supported by substantial simulation and design validation. A new battery with increased cooling capability and reworked high and low voltage electronics systems have enhanced FE5's reliability and efficiency, as well added support for augmented data collection and vehicle diagnostic capabilities. Other critical design elements include modularity, manufacturability, backwards compatibility, and safety.



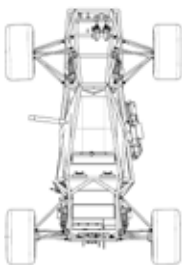
**BRAKE** : Custom Rotor / Tilton Master Cylinder / Honda Caliper  
**COOLING** : Passive Air Motor and Motor Controller, Directed Air Battery  
**DRIVE** : RWD, Single Ratio, Chain Reduction Drive, Torsen Differential  
**ELECTRONICS** : Custom BMS  
**EMCAC** : NCM-cathode Li-Ion / 6.2kWh  
**FR/RR TRACK** : 1231mm / 1231mm  
**FRAME** : Steel Spaceframe  
**MATERIAL** : 4130  
**MAXMOTORRPM** : 6000  
**MAXSYSVOLT** : 116  
**MOTORCNTRLR** : Curtis 1239e Custom Prototype  
**MOTORTYP** : ZERO Z-Force 75-7R  
**NMLMM** : 1 / Rear / 50kW  
**OLWH** : 2670.8mm / 1468.1mm / 1105mm  
**SUSPENSION** : Unequal Length Double Wishbone, Pushrod-Actuated Spring  
**TIRE** : 20.5x7-13 R25B Hoosier  
**TRANSRATION** : 4.75:1  
**WEIGHT** : 613lb (with driver)  
**WHEELBASE** : 1524mm







VTM18e is the 2nd electric vehicle produced by Virginia Tech Motorsports for competition in Formula SAE Electric events. Using knowledge from the well-established combustion side of our team and last year's experience, we developed quantifiable goals and a formal testing program to validate the models used for system level designs. A simple architecture for the vehicle incorporates a steel tube space frame that builds on last year's. Reliability and safety are the two most important factors that are considered in the design of the high voltage electrical system. Our first look at performance came this year when we increase the number of modules from 66 to 72 to achieve a higher capacitance. The car is once again powered by a 40 kW Brammo electric motor controlled by an InMotion ACS80XL motor controller. An adjustable limited-slip differential allows the torque bias ratio to be tuned for acceleration and deceleration events. The suspension, powertrain, electrical, and ergonomic systems were designed, analyzed, and tested to ensure drivers from amateur to professional skill level are capable of consistently driving the car at its tractive limit and able to win the FSAE competition.



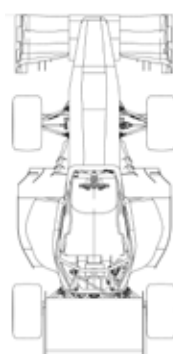
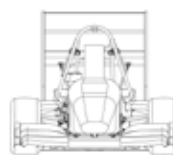
**BRAKE :** Slotted floating rotor, AP racing calipers  
**COOLING :** Sidepod ducted radiator  
**DRIVE :** Chain drive, stock gearbox, Drexler LSD  
**ELECTRONICS :** Custom, modular low voltage PCBs  
**EMCAC :** Lithium-Ion/ 4.8 kWh  
**FR/RR TRACK :** 1149 mm/ 1149 mm  
**FRAME :** Steel tube spaceframe  
**MATERIAL :** carbon fiber, aluminum, steel, titanium  
**MAXMOTORRPM :** 8000 RPM  
**MAXSYSVOLT :** 100 Volts  
**MOTORCNTRLR :** Kollmorgen ACS80XL  
**MOTORTYP :** Brammo GVM Traction Motor  
**NMLMM :** 1/ rear, centered / 25 kW  
**OLWH :** 2927 mm, 1438 mm, 1052 mm  
**SUSPENSION :** Double unequal length A-arm with pullrod actuated coil springs/dampers  
**TIRE :** 18x6.0 - 10 Hoosier R25B  
**TRANSRATION :** 3.8  
**WEIGHT :** 630 lb  
**WHEELBASE :** 1537 mm



The WR-218e is Wisconsin Racing's second electric vehicle, and it features a redesigned high voltage battery, student-designed motors and motor controllers, and custom high torque density compound planetary transmissions. The bolstered electric powertrain is integrated with a hybrid carbon fiber monocoque/steel space frame chassis and lightweight aerodynamics package. At 425 [lb], the WR-218e is 80 [lb] lighter than last year's car, with a more balanced rear weight bias of 52 [%], and four electric motors capable of 160 [HP] peak at the wheels.

This year, the team especially wanted to focus on serviceability, ease of trouble-shooting, and minimizing part count. We designed motor controllers with built-in hardware fault protection circuitry, focused on the sealing mechanisms for all high voltage enclosures, and designed an in-wheel powertrain that is identical for all four wheels of the vehicle.

From conception to final assembly of the WR-218e, making decisions strongly rooted in first principles has been at the core of Wisconsin Racing's process. The WR-218e, both in its scope and ambition, represents the next generation of student-designed high performance electric vehicles.



**BRAKE :** Floating rotors, sintered metal pads  
**COOLING :** Water-jacket cooled motors, inverter cold plates, dual radiators  
**DRIVE :** All-wheel drive, compound planetary gear sets  
**ELECTRONICS :** Woodward PCM 112, 3-axis IMU, custom BMS  
**EMCAC :** Lithium Manganese Oxide, 6.5 kWh  
**FR/RR TRACK :** 1143 mm (45 in)  
**FRAME :** Hybrid front monocoque, rear steel spaceframe  
**MATERIAL :** Epoxy prepreg carbon fiber, 5052-Al honeycomb, 4130 steel  
**MAXMOTORRPM :** 20000 RPM  
**MAXSYSVOLT :** 252V  
**MOTORCNTRLR :** Custom Quad Inverter  
**MOTORTYP :** Custom Interior Permanent Magnet Brushless AC  
**NMLMM :** 4 in-hub, 30 kW each  
**OLWH :** 2972 x 1384 x 1179 mm (117 x 54.5 x 46.5 in)  
**SUSPENSION :** Double unequal length A-arm, pullrod-actuated  
**TIRE :** Hoosier R25B-18.0x7.5-10  
**TRANSRATION :** 13.67:1  
**WEIGHT :** 260 kg (575 lb)  
**WHEELBASE :** 1600 mm (63 in)



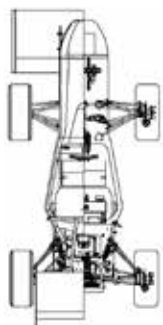
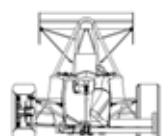
## California Polytechnic State University-SLO

### Cal Poly Racing Electric



The CP18E, fondly called "Fannie," remains mechanically similar to the previous year's CP17E, with a single electric motor, composite monocoque chassis, double-wishbone suspension, and two-element front and rear wings; however, significant changes were made to electronics, electrical system packaging, and driver controls to improve serviceability and reliability. Finishing the endurance event is critical to the CP18E's competition performance, so thorough testing, especially of powertrain and electrical controls, was emphasized. The CP18E benefits from sharing components with the team's combustion vehicle, increasing manufacturing efficiency and providing insight through data to accelerate the tuning process.

We'd like to thank all of our partners, private donors, the Cal Poly ME department and shops, and our families and friends for supporting us in this long and sleepless venture. We'd also like to thank our faculty advisor, Fab, for his superb technical advice and tough love.



**BRAKE :** Tilton 78 Series 5/8, 7/10 bore master cylinders; Brembo P34, P32 calipers  
**COOLING :** Accumulator: fans w/ external ducting; motor/motor controller: water-cooled  
**DRIVE :** Chain drive, single-speed reduction, Drexler limited-slip differential  
**ELECTRONICS :** Control by NI sbRIO, live telemetry, custom PDM and CAN-based dash display  
**EMCAC :** LiPo, Samsung INR25R, 6.48 kWh  
**FR/RR TRACK :** 47/46"  
**FRAME :** CFRP Monocoque  
**MATERIAL :**  
**MAXMOTORRPM :** 5500 RPM  
**MAXSYSVOLT :** 298 V  
**MOTORCNTRLR :** Rinehart Motion Systems PM100DX  
**MOTORTYP :** Enstroj EMRAX 228 Brushless DC Electric Motor  
**NMLMM :** Single rear motor, 100 kW at 5000 RPM  
**OLWH :** 114", 54", 45"  
**SUSPENSION :**  
**TIRE :** Hoosier R25B 20.0x7.0-13  
**TRANSRATION :** 4.16:1  
**WEIGHT :** 610 lbs  
**WHEELBASE :** 61"

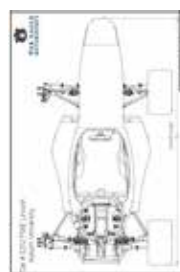
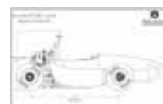
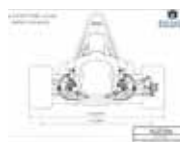


## Auburn University

### War Eagle Motorsports Electric



AU-2018c was designed with two primary goals in mind: lightweight and reliable. Building on the hybrid monocoque/steel space frame platform that has been a staple of the team since 2012, we have been able to optimize the chassis to be the lightest version the team has ever designed. Featuring dual Emrax 208 motors, the car has plenty of power, while also being capable of brake regeneration and torque vectoring. Furthermore, by utilizing resin infusion in our composites manufacturing, we were able to make composites parts even lighter and stronger.



**BRAKE :** Floating Rotor, Adjustable Bias  
**COOLING :** Dual sidepod-mounted, single-pass radiators  
**DRIVE :** RWD, 5:1 gear reduction per rear mounted motor  
**ELECTRONICS :** HY-TTC 500 ECU, Student Built Shut-down Circuit  
**EMCAC :** Copper, Aluminium / 6.3kWh Accumulator Capacity  
**FR/RR TRACK :** 1194/47/1194/47  
**FRAME :** Hybrid CFRP Monocoque, Steel Spaceframe  
**MATERIAL :** Various  
**MAXMOTORRPM :** 7000 RPM  
**MAXSYSVOLT :** 105V  
**MOTORCNTRLR :** EMSISO / EM Drive 500 (Quantity: 2)  
**MOTORTYP :** Synchronous, 3-Phase  
**NMLMM :** 2 Motors / Rear Center Mounted / 80kW  
**OLWH :** 288/113.7/1439/56.7/1167/45.96  
**SUSPENSION :** SLA  
**TIRE :** Hoosier 18.0 x 7.5-10 R25B  
**TRANSRATION :** Primary (Only) - 5:1 Drive to Driven ratio  
**WEIGHT :** 605 LBS  
**WHEELBASE :** 1530/60.25



**E214**

## Kookmin University KUST



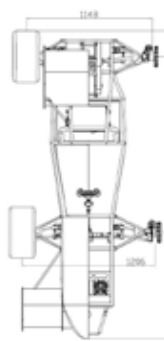
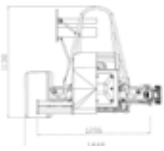
Our team designed for finishing all of the dynamic events

**E215**

## University of Akron Zips Electric Racing



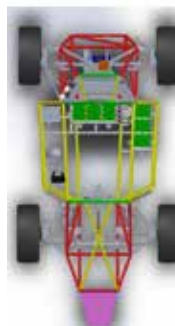
ZER18 is an FSAE Electric vehicle targeting simplicity and reliability. This year, a new Orion 72 channel BMS manages a 300 Volt Li-Po accumulator to send power from an EMRAX 228 motor to the rear wheels through a Taylor Race Engineering differential. A steel tube frame keeps cost low, but basic carbon fiber bodywork balances simplicity with mass reduction.



**BRAKE :** front Brembo / rear Wilwood  
**COOLING :** Liquid  
**DRIVE :** Chain  
**ELECTRONICS :**  
**EMCAC :** Li-ion/ 7.05kWh  
**FR/RR TRACK :** 1206/1148  
**FRAME :** Steel  
**MATERIAL :** Al, Steel, CFRP  
**MAXMOTORRPM :** 6000  
**MAXSYSVOLT :** 294  
**MOTORCNTRLR :** Bamocar D3  
**MOTORTYP :** BLAC  
**NMLMM :** 1/Rear/80kW  
**OLWH :** 2816/1448/1138  
**SUSPENSION :** Double wishbone  
**TIRE :** 18x7.5x10 R25B  
**TRANSRATION :** 3.84  
**WEIGHT :** 674  
**WHEELBASE :** 1600



South Korea



**BRAKE :** Tilton 78 Series Master Cylinders  
**COOLING :** Motor: Liquid / Accumulator: Air  
**DRIVE :** RWD with Taylor Single Drive Differential  
**ELECTRONICS :** Orion BMS, 72 Channel  
**EMCAC :** Li-Po, 20.5 Ah  
**FR/RR TRACK :** 48" Fr / 48" Rr  
**FRAME :** Welded Steel Tubing  
**MATERIAL :** 4130 Chromoly Steel Tubing  
**MAXMOTORRPM :** 6500 RPM / 5500 RPM continuous  
**MAXSYSVOLT :** 300 V  
**MOTORCNTRLR :** Rinehart Motion Systems PM100  
 Series AC Motor Drive  
**MOTORTYP :** Enstroj EMRAX HV228  
**NMLMM :** 1/Rear/100kW  
**OLWH :** 98.5" L x 48" W x 42" H  
**SUSPENSION :** Fully independent, front pullrod, rear pushrod, Penske 7800-Piggyback dbl adj  
**TIRE :** Hoosier 20.5x6 R13 Road Racing  
**TRANSRATION :** 1-speed, 3.46:1  
**WEIGHT :** 689 lb  
**WHEELBASE :** 60.5"



United States



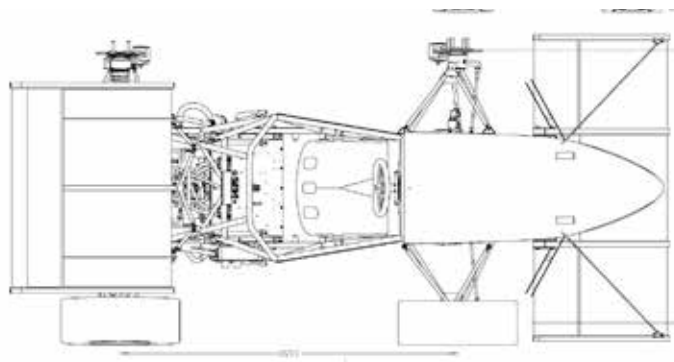


The 2018 race season marks the inaugural year for the FP-e, or formula Panther electric! Our program was founded by students for students with the dream of establishing a program that inspires innovative sustainable transportation in a fast, fun, and hands on way. However, this being our first year we focused on following the KISS method, or keeping it simple silly in an effort to build a strong, reliable foundation for our team to build on in the future. We're excited to attend the competition in Lincoln and are looking forward to the growth of our program over time.

This year has been a long journey for us, and we have not been alone. None of this would be possible without the hard work and dedication of our alumni internal combustion teams who have set the example for us to follow, and the support of our faculty and sponsors. We would like to extend a special thank you to our alumni, friends, families, advisers, sponsors, and Florida Tech for their unwavering support as well as the opportunity to represent them at competition.

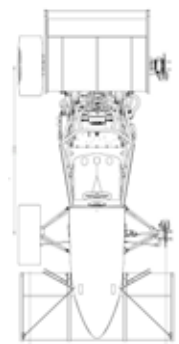
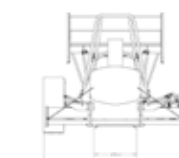


**BRAKE :** Floating 9" Rotors, Willwood Master Cylinders  
**COOLING :** Single pass 10"x16" aluminum core, 8" fan  
**DRIVE :** RWD, Chain Drive With Drexler Differential  
**ELECTRONICS :** Custom  
**EMCAC :** LiFeMnPo4  
**FR/RR TRACK :** 1135.21/1044.9  
**FRAME :** Space Frame  
**MATERIAL :** Steel  
**MAXMOTORRPM :** 6,500 RPM  
**MAXSYSVOLT :** 300 V  
**MOTORCNTRLR :** Rineheart PM100DX  
**MOTORTYP :** Emrax 228  
**NMLMM :** 1 / Rear / 100 kW  
**OLWH :** 2741mm, 1460mm, 1192mm  
**SUSPENSION :** Double unequal A-Arm, push-rod actuated spring and damper  
**TIRE :** 20.5x7.0-13, R25B Hoosier  
**TRANSRATION :** 5:1  
**WEIGHT :** 650  
**WHEELBASE :** 1543.45 mm



With a young team, Waterloo Formula Electric has gone in a completely new direction for 2018. Goals for the season prioritize reliability and design sustainability. In the favour of serviceability and unsprung mass reduction, the powertrain system has switched from the previously in-hub motors to a dual inboard architecture employing a chain reduction. The 2018 car also features a 100% all-new battery design, utilizing LiCoO2 pouch cells in a 72s4p configuration and a light-weight air cooling system.

The distributed electrical architecture has undergone many iterative updates from the previous vehicle. Telemetry and enhanced communication abilities have been added, along with the potential to develop a torque vectoring that takes advantage of the independant rear motor drive. The aero package on the car is mostly a carry over from the previous year.



**BRAKE :** Single piston calipers at each corner  
**COOLING :** Water cooled motors and motor controllers  
**DRIVE :** Chain reduction  
**ELECTRONICS :** Custom  
**EMCAC :** 6.5 kWh  
**FR/RR TRACK :** 1240 F / 1240 R mm  
**FRAME :** Steel space frame  
**MATERIAL :** 4130  
**MAXMOTORRPM :** 6000  
**MAXSYSVOLT :** 294  
**MOTORCNTRLR :** Sevcon Gen5-Size9  
**MOTORTYP :** EMRAX 208  
**NMLMM :** Dual rear inboard motors, 80kW max power  
**OLWH :** 3031 x 1443 x 1180 mm  
**SUSPENSION :** Pull-rod, double-wishbone  
**TIRE :** 20.5 in, Hoosier r25b  
**TRANSRATION :** 3.46:1  
**WEIGHT :** 303 kg  
**WHEELBASE :** 1550 mm



**E219**

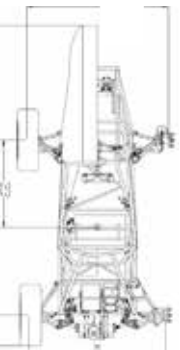
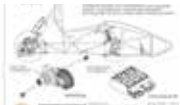
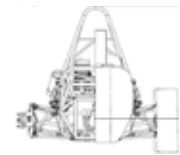
## University of Texas - Austin

### Longhorn Racing Electric



Our 2018 car features a heavy focus on accumulator-centric design to define many packaging parameters. To expedite the design and manufacturing process, a focus on parallel methodologies was developed to have quickly adaptable parts and assemblies utilizing global reference sketches. Through a combination of CAD, FEA, and hand calculations, the components of the vehicle were developed using first principles and design for manufacturability.

To comfortably accommodate all drives and our powertrain, we slightly widened the frame. Our accumulator utilizes cylindrical cells for easier packaging and assembly. The motor and drivetrain were also designed with simplicity and robustness in mind, using a locked differential and single motor. The net result is a simple car, which we can easily manufacture and drive.



**BRAKE :** Outboard front, Inboard rear disc brakes  
**COOLING :** Liquid cooled motor  
**DRIVE :** 3:1 Chain driven spool  
**ELECTRONICS :** Custom PCB system linked via CAN communication  
**EMCAC :** Samsung INR 18650-25R; 6.3 kWh  
**FR/RR TRACK :** 48"/46.5"  
**FRAME :** Welded Space Frame  
**MATERIAL :** 4130 Steel  
**MAXMOTORRPM :** 6500  
**MAXSYSVOLT :** 260 V  
**MOTORCNTRLR :** Tritium Wavesculpter 220  
**MOTORTYP :** Emrax 228 MV CC (AC sinusoidal three phase permanent magnet)  
**NMLMM :** Single Motor, Rear Wheel Drive, 80 kW  
**OLWH :** 109.5" x 55" x 48.4"  
**SUSPENSION :** Double wishbone, pushrod  
**TIRE :** 20.5 x 7.0-13; R25B  
**TRANSRATION :** 3:1  
**WEIGHT :** 621  
**WHEELBASE :** 60"

**E220**

## University of Illinois - Urbana Champaign

### Illini Formula Electric



Illini Formula Electric has been building momentum as a team over the last few years. Two years ago, we passed electrical tech inspection for the first time and last year we passed all tech inspections and were able to compete in several events at the Lincoln competition. This year we are iterating on that past success with the goals of passing inspections in time to compete in all events and also to improve our scores over those we posted last year. Improvements on our mechanical design this year have focused on weight and size reduction, as well as fully assessing and mitigating some recurring problems we have had in the past. Electrical design has focused on improving reliability of the system and increasing our data acquisition capability. We consider data acquisition to be crucial for the team's further development since it will allow us to make more informed design decisions going forward. In order to facilitate improved data acquisition, we have incorporated a functional CAN communication bus for the first time this year.



**BRAKE :** AP Racing calipers, custom rotors  
**COOLING :** Liquid-cooled motor and motor drive  
**DRIVE :** Fixed-gear chain drive  
**ELECTRONICS :** Traction control, custom real-time telemetry, CAN-driven sensor network  
**EMCAC :** LiFePO4, 10Ah  
**FR/RR TRACK :** 1244.6 mm / 1211.6 mm  
**FRAME :** Welded space frame  
**MATERIAL :** 4130 Steel  
**MAXMOTORRPM :** 7500 rpm  
**MAXSYSVOLT :** 300 V  
**MOTORCNTRLR :** Sevcon Gen4-S8  
**MOTORTYP :** YASA-400  
**NMLMM :** Single motor, RWD, 80kW  
**OLWH :** 3045 mm, 1463 mm, 1181 mm  
**SUSPENSION :** Double-wishbone, pushrod-actuated  
**TIRE :** 20.5" Hoosier R25B  
**TRANSRATION :** 3:1  
**WEIGHT :** 690 lbs  
**WHEELBASE :** 1625.6 mm



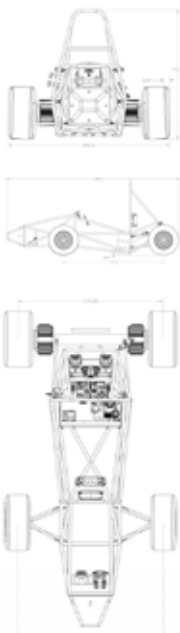
**E221**

## University of California - Santa Cruz

### Formula Slug



Formula Slug would like to present to you FS-1, our first track-ready electric racecar. Although our university does not have a mechanical engineering department, we have not let that stop us. After three years and one prototype vehicle, we have designed a robust, yet unique vehicle featuring dual outboard motors on a beam axle suspension, front double wishbone suspension, <100lb accumulator, and carbon fiber body on a chromoly tube frame.



**BRAKE** : 77-Series Master Cylinders, Wilwood GP200  
**COOLING** : Passive Air  
**DRIVE** : RWD, Planetary Hub Motor  
**ELECTRONICS** : elithion Lithiumate HD BMS  
**EMCAC** : LiNiMnCo2 / 5.25kWh  
**FR/RR TRACK** : 1206, 1194 mm  
**FRAME** : Tubular Space Frame  
**MATERIAL** : 4130 Chromoly Steel  
**MAXMOTORRPM** : 6000  
**MAXSYSVOLT** : 117.6  
**MOTORCNTRLR** : Dual Sevcon Gen 4 Size 4  
**MOTORTYP** : ZERO Z-Force 75-5  
**NMLMM** : 2 / Rear / 50kW  
**OLWH** : 2700, 1430, 1150 mm  
**SUSPENSION** : F: Unequal Length Double Wishbone, R:  
**TIRE** : F: 18x6-10, R: 18x7.5-10 RB25 Hoosier  
**TRANSRATION** : 3.5  
**WEIGHT** : 570  
**WHEELBASE** : 1524 mm

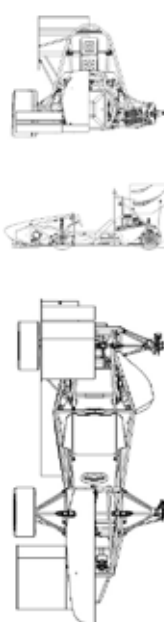
**E223**

## Carnegie Mellon University

### Carnegie Mellon Racing



Excited to be returning to Formula Electric @Lincoln after 1 year's absence, Carnegie Mellon Racing presents 18e -- our 5th electric car in 5 years. The design of 18e sought to address specific shortcomings from our 2017 car without changing our most successful systems. Our newly designed drivetrain features one Emrax-228 100kW electric motor packaged in an integrated, removable drive module made up of an 11:44 tooth, 520 chain sprocket with a Quaife ATB (TRE MKII) differential with 4340 splined half shafts and tripod joints. The aerodynamics package, also newly designed for 18e, uses E423 airfoils for high lift effects at low Reynolds numbers and large endplates to improve lift to drag ratios. Our accumulator architecture remains unchanged from 2017, but contains a newly designed custom distributed battery management system to safely monitor our 720 individual battery cells and provide the driver with useful accumulator state information. Our successful GLV system returns for another year, utilizing 10 custom PCBs and two CAN buses in a distributed architecture running FreeRTOS to robustly monitor safety critical sensors and car state.



**BRAKE** : Floating, ASTM A48 class rotors with Tilton Racing 72-Series master cylinder  
**COOLING** : Distilled water loop (motor, motor controller); forced air (accumulator)  
**DRIVE** : 520 chain, 11t - 44t (4:1 ratio)  
**ELECTRONICS** : 11 unique custom PCBs utilizing 8-bit and 32-bit MCUs with 2 CAN buses  
**EMCAC** : Lithium Nickel Cobalt Aluminum Oxide; 72s10p; 6.5kWh  
**FR/RR TRACK** : 1323/1244 (mm)  
**FRAME** : Welded Steel Tubular Space Frame  
**MATERIAL** : 4130 Steel TIG welded with ER80S-D2  
**MAXMOTORRPM** : 5000 RPM  
**MAXSYSVOLT** : 299.5V  
**MOTORCNTRLR** : Rinehart Motion Systems PM100DX  
**MOTORTYP** : Emrax 228 synchronous perm. magnet pancake axial flux  
**NMLMM** : 1 motor in rear of vehicle driving rear wheels; 100kW  
**OLWH** : 3161 x 1519 x 1162.3 (mm)  
**SUSPENSION** : Double A-Arm, Pushrod, Anti-Roll Bar  
**TIRE** : 18.0 x 6.0-10, R25B, Hoosier  
**TRANSRATION** : 11:44  
**WEIGHT** : 650 lbs. (295 kg)  
**WHEELBASE** : 1650.8 mm (65 inches)





**E224**

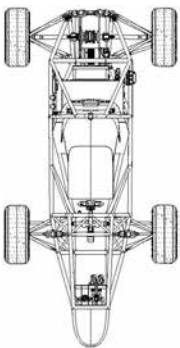
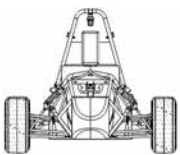
## San Diego State University

### Aztec Electric Racing



Aztec electric racing (AER) is San Diego State University's Formula SAE Electric team, competing in the Formula SAE EV competition in Lincoln Nebraska. 2018 is the second year in which San Diego State has had an EV team; because of the limited pool of team knowledge it was critical that the 2018 team focus their attention primarily on the systems which received non rules compliant evaluations at the previous years competition. As a team we identified three areas in which to focus our efforts: Energy storage, System controls, and Powertrain. By focusing our team on these key systems we will be able to achieve our team goal. "To design and build a soundly built, thoroughly tested electric race car, in compliance with all FSAE rules, weighing 475 pounds, capable of completing the endurance event at the international FSAE competition, in Lincoln Nebraska on June 20th 2018."

AER's core philosophy is to utilize the full product design cycle, emphasizing the key elements of mechanical engineering design; System level diagrams, PDR, CDR, MDR and appropriate documentation. Through the careful actuation of these processes our team will be able to accomplish our overall team goals.



**BRAKE :** Floating Rotors, Wilwood Calipers, Tilton MC  
**COOLING :** Liquid Cooled, Side Mounted Radiator  
**DRIVE :** RWD Gear Stage Gear Reduction to Drexler Differential  
**ELECTRONICS :** Comparators, relays, glue logic.  
**EMCAC :** LiNiCoAlO<sub>2</sub>/ 8.9 kWh  
**FR/RR TRACK :** 50"  
**FRAME :** Tubular Space Frame  
**MATERIAL :** 4130 Steel  
**MAXMOTORRPM :** 14,000  
**MAXSYSVOLT :** 300  
**MOTORCNTRLR :** Sevcon Gen 4 Size 8  
**MOTORTYP :** Alta Redshift, 3 Phase PMAC  
**NMLMM :** 1/Center Rear/30Kw  
**OLWH :** 105", 50", 46"  
**SUSPENSION :** Double Unequal length A-arm w/ Push-rod actuated springs and dampers  
**TIRE :** 6.0/18.0-10 LCO  
**TRANSRATION :** 1:10  
**WEIGHT :** 620  
**WHEELBASE :** 60 In

**E225**

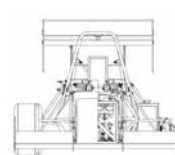
## Purdue University - W Lafayette

### Purdue Electric Racing



Designed from the ground up to take full advantage of the electric powertrain, Purdue Electric Racing presents our fastest and most heavily tested car yet with PER 2018. Prioritizing a simple, yet elegant design, the team created a car that boasts tested reliability and robustness.

Purdue Electric Racing would also like to give a special thank you to all our sponsors that helped make this car a reality, as well as providing all our members a chance for an invaluable learning experience.

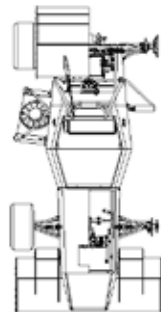
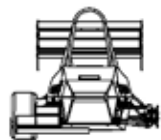


**BRAKE :** Custom Rotors, Wilwood GP-200/PS1, Tilton 77-Series MCs  
**COOLING :** Water-cooled Powertrain, Air-cooled Accumulator  
**DRIVE :** RWD, Chain-drive, Drexler LSD  
**ELECTRONICS :** STM32 w/ Custom PCBs  
**EMCAC :** Lithium Ion, NMC / 8.5kWh  
**FR/RR TRACK :** 1270mm / 1220mm  
**FRAME :** Steel Tube Space-Frame  
**MATERIAL :** 4130 Chromoly Tubing  
**MAXMOTORRPM :** 6160  
**MAXSYSVOLT :** 300  
**MOTORCNTRLR :** Unitek BAMOCAR D3  
**MOTORTYP :** PMSM EMRAX 228  
**NMLMM :** 1 x 61 kW / Inboard  
**OLWH :** 3038mm / 1480mm / 1200mm  
**SUSPENSION :** Double Wishbone, Pushrod system with ARB  
**TIRE :** 6.0/18.0-10 LCO Hoosier  
**TRANSRATION :** 3.5 : 1  
**WEIGHT :** 570 lb with 150 lb driver  
**WHEELBASE :** 1575 mm

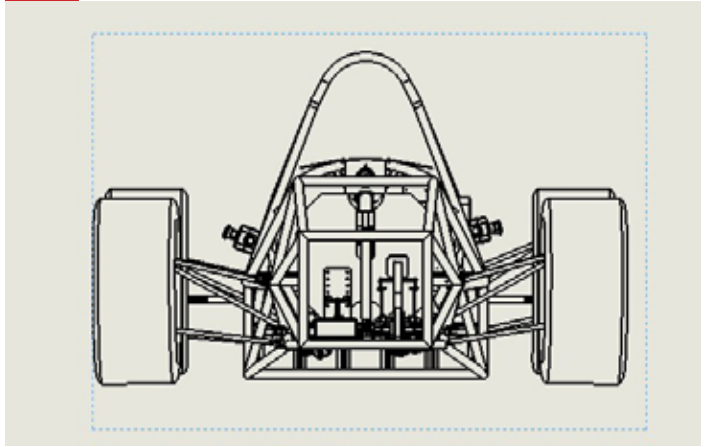




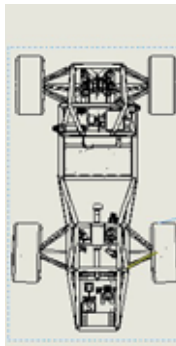
The Formula U Racing team continues the design of what has become a two year electric vehicle. This year focused on optimizing the initial chassis and suspension prototypes, as well as a complete redesign of the accumulator. With an established vehicle concept from the 2017 team, this second year of development for Formula U's first electric vehicle has been focused on detail oriented design. The team chose to completely redesign the battery accumulator after consulting with judges and spectating the 2017 dynamic events. Prismatic pouches were replaced with steel shrouded cells and a water cooling system was designed to support the high temperatures experienced at the Lincoln event.



**BRAKE :** Brembo P34 Caliper, Laser cut steel discs  
**COOLING :** Water cooled motor, controller, and accumulator  
**DRIVE :** Chain to Drexler LSD  
**ELECTRONICS :** Beaglebone PCM  
**EMCAC :** Li-Ion, 3.4 kWh  
**FR/RR TRACK :** 1325/1262 mm  
**FRAME :** Full Carbon Fiber Monocoque  
**MATERIAL :** Cycom 985 plain weave prepreg, IM7 8551-7 unidirectional prepreg  
**MAXMOTORRPM :** 6800  
**MAXSYSVOLT :** 252 V  
**MOTORCNTRLR :** RMS PM100DX  
**MOTORTYP :** Parker GVM, AC axial flux  
**NMLMM :** Single internal motor, 68kW  
**OLWH :** 3048, 1550, 1295 mm  
**SUSPENSION :** Unequal A arm, pushrod actuated  
**TIRE :** 18" Hoosier Slick  
**TRANSRATION :** 2.24:1  
**WEIGHT :** 750lb  
**WHEELBASE :** 1783 mm



The 2017-2018 Caltech Racing Team, in its third year, is competing in Formula SAE Electric in Lincoln, Nebraska. With two years of previous competition experience the team redesigned and improved on the first version of the vehicle this year. Looking back at the outcome the previous years, we placed our primary goal to pass the rigorous technical inspection, of which, has had a historically low passing rate. With this in mind, our next goal was to design and build a vehicle that would finish all the events and was easy to manufacture and repair. Lastly, after accomplishing this, we looked to improve and optimize performance.



**BRAKE :** Wilwood Dynapro Single Piston  
**COOLING :** Water Cooled, single radiator  
**DRIVE :** RWD, Chain Drive  
**ELECTRONICS :** BMS, team developed control system and data acquisition  
**EMCAC :** EMCAC : Li (NMC), 6.3 kWh  
**FR/RR TRACK :** 1270mm / 1220mm  
**FRAME :** Tubular Spaceframe  
**MATERIAL :** 4130 Steel  
**MAXMOTORRPM :** 6000 RPM  
**MAXSYSVOLT :** 287  
**MOTORCNTRLR :** Custom  
**MOTORTYP :** Enstroj EMRAX 208 Brushless AC, Synchronous  
**NMLMM :** 1 Motor/Rear/80 kW  
**OLWH :** 2980 mm / 1500 mm/ 1203mm  
**SUSPENSION :** Double Unequal Length A-Arm. Pull Rod Actuated Coil Over Damper  
**TIRE :** Pirelli 200/540-13 DSS/WS (Front) 250/575-13 DSS/WS (Rear)  
**TRANSRATION :** (5 :1)  
**WEIGHT :** 250 kg  
**WHEELBASE :** 1575 mm





Velox Racing has designed their first ever car from the ground up with simplicity, budget and manufacturability in mind. The car features a welded mild steel space frame with an equal length double A arm suspension. The car is running on the new 16" diameter Hoosier tires. The heart of the car is AC motor salvaged from a 2016 Toyota Prius which delivers power to the wheels through a spool. It is powered by a 8kWh battery pack made in house from Samsung 25R 18650 cells. The car is driven by a custom control unit and features an Orion BMS2 battery management system.

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**BRAKE :** 4 Brembo Calipers, 2 Tilton Master Cylinders  
**COOLING :** N/A  
**DRIVE :** Single P610 Toyota Prius MG2 motor  
**ELECTRONICS :** Custom ECU  
**EMCAC :**  
**FR/RR TRACK :** 52" Front, 50" rear  
**FRAME :** Space Frame  
**MATERIAL :** 1020 Mild Steel  
**MAXMOTORRPM :**  
**MAXSYSVOLT :** 270V  
**MOTORCNTRLR :**  
**MOTORTYP :**  
**NMLMM :** 1 55kW rear motor  
**OLWH :**  
**SUSPENSION :** Equal Length double wishbones  
**TIRE :** 16 x 7.5 Hoosier R25B  
**TRANSRATION :**  
**WEIGHT :** 600  
**WHEELBASE :** 60.5"





## 2018 FORMULA SAE **KEY PLAYERS**

There is a large group of individuals who make sure the numerous details are completed to make a successful event.

### **SAE INTERNATIONAL STAFF**

- Kaley Zundel – Collegiate Program Manager
- Sam Barill – Collegiate Program Manager
- Martha Tress – Recruitment Sales Manager
- Amanda Paciorkowski – University Programs Developer
- Sara Guffey – University Programs Coordinator
- Ryan Good – University Programs Coordinator
- Victoria Ewing – University Programs Associate

### **SCCA LIASON**

- Clancy Schmidt
- Howard Duncan

### **FSAE COURSE DESIGNER**

- Roger Johnson

### **TRACK ANNOUNCER**

- Raleigh Boreen

### **TECHNICAL INSPECTOR LEADS – COMBUSTION**

- Matt Petty
- Alex Buchka

### **TECHNICAL INSPECTOR LEADS – ELECTRIC**

- Danny Bocci
- Lance Turner

### **EVENT CAPTAINS**

- Brake – Ali Zangeneh
- Noise – Chad Walber
- Tilt – Gary Young
- Practice – Jim McNeil
- Fuel – Janice Hueske
- Scales – Quinten Jordan
- Presentation – Reed Greenwood
- Design – David Redszus and Steve Fox
- Cost – Suzy Zukowski, Leo Abels and Steve Taylor
- Acceleration – Quinten Jordan
- Skid Pad – Joe Losito
- Autocross – Jacob Homer
- Endurance – Lawrence Raitinger
- Chief National Scorekeeper – Steve Sayovitz

# THANK YOU TO OUR 2018 SPONSORS

## EVENT PARTNERS



# HONDA

Honda R&D Americas

## DIAMOND PARTNERS

# GENERAL MOTORS

## GOLD PARTNERS



Working Right.



## SILVER PARTNERS

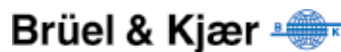


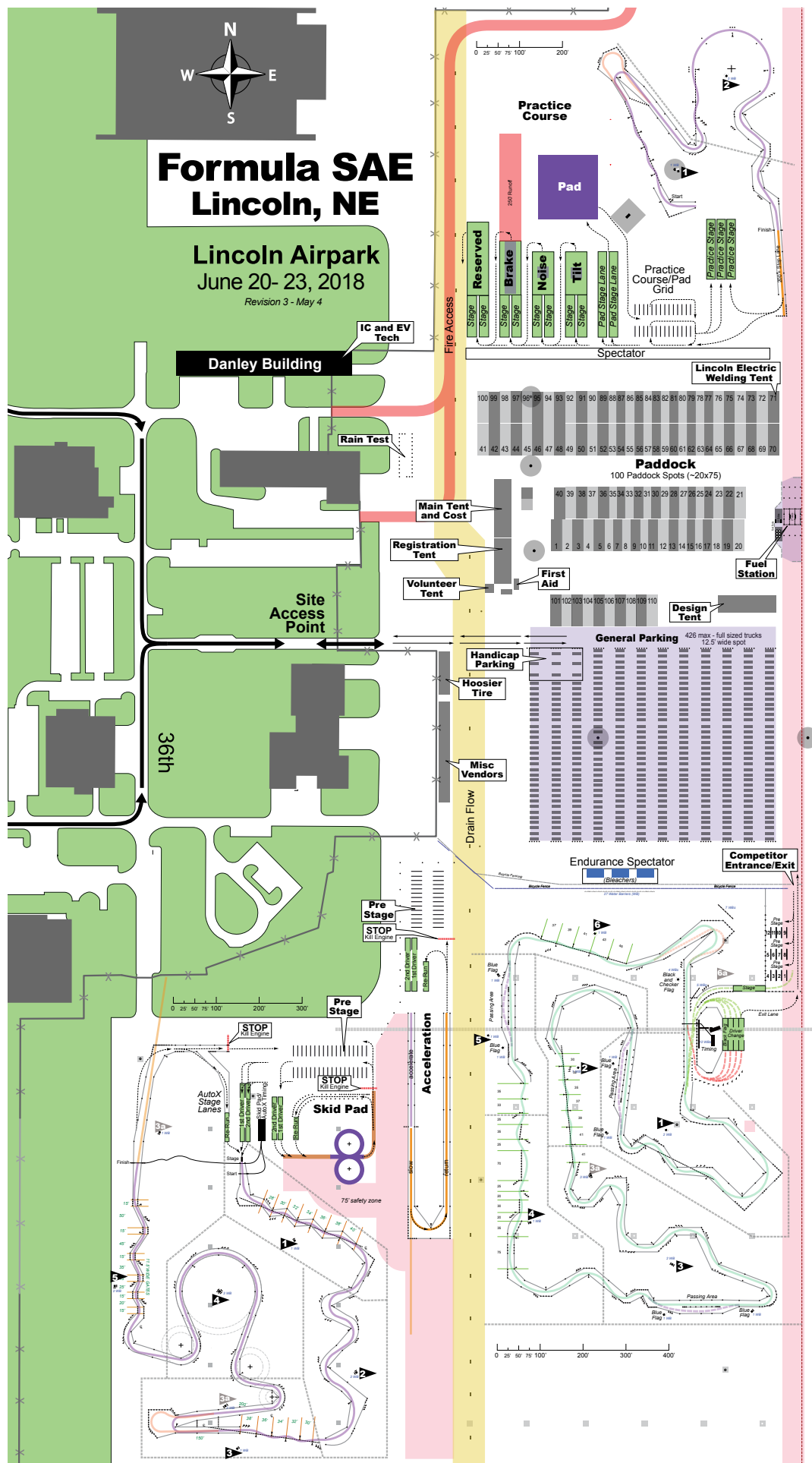
## BRONZE PARTNERS



Nebraska Ethanol Board

## FRIEND OF FORMULA







## OFFICIAL EVENTS

### FORMULA SAE MICHIGAN

May 9-12, 2018

Michigan International Speedway, Brooklyn, Michigan

### FORMULA SAE LINCOLN & FORMULA SAE ELECTRIC

June 20-23, 2018

Lincoln Airpark, Lincoln Nebraska

### FORMULA SAE AUSTRALASIA

First Competition - 2000

Website: [saea.com.au/formula-sae-a/](http://saea.com.au/formula-sae-a/)

### FORMULA SAE BRASIL

First Competition - 2004

Website: [saebrasil.org.br/eventos/programas\\_estudantis/](http://saebrasil.org.br/eventos/programas_estudantis/)

### FORMULA SAE ITALY

First Competition - 2005

Website: [ata.it/content/event-formula-ata/formula-sae-italy-formula-electric-italy-2015](http://ata.it/content/event-formula-ata/formula-sae-italy-formula-electric-italy-2015)

### FORMULA STUDENT

First Competition - 1998

Website: [formulastudent.com/](http://formulastudent.com/)

### FORMULA STUDENT AUSTRIA

First Competition - 2009

Website: [fsaustria.at](http://fsaustria.at)

### FORMULA STUDENT GERMANY (FSG)

First Competition - 2006

Website: [formulastudent.de/](http://formulastudent.de/)

### FORMULA SAE JAPAN

First Competition - 2003

Website: [jsae.or.jp/formula/en/](http://jsae.or.jp/formula/en/)

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2017 EV Class Overall Winner  
University of Pennsylvania