FORMULA HYBRID
organized by Dartmouth College
April 30th – May 3rd
New Hampshire, United States

FORMULA SAE MICHIGAN
organized by SAE International
May 9th – 12th
Michigan, United States

FORMULA SAE LINCOLN
organized by SAE International
June 20th – 23rd
Nebraska, United States

FORMULA SAE-AUSTRALASIA
organized by SAE Australia
Australia
www.saea.com.au/formula-sae-a

FORMULA SAE – BRASIL
organized by SAE Brasil
Brasil
www.saebrasil.org.br

FORMULA SAE – ITALY
organized by ATA
Italy
www.ata.it/formulaaata/formulasaeit

FORMULA STUDENT
organized by IMeche in partnership with SAE
United Kingdom
www.formulastudent.com

FORMULA STUDENT GERMANY
organized by VDI
Germany
www.formulastudent.de

http://students.sae.org/competitions/formulaseries/
Formula SAE Michigan
2012 SAE President’s Message

Dear Formula SAE Participants and Organizers:

Welcome to the Formula SAE competition, which is held at Michigan International Speedway in Brooklyn, Michigan.

Formula SAE is steeped in tradition and competition. Now in its 34th year, Formula SAE provides the real-world challenges of systems engineering, design and problem solving, along with the teaming challenges of collaboration and cooperation. In short, Formula SAE, along with all of the SAE Collegiate Design Series competitions, provides 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 a winner because they will be better engineering students.

Good luck to all who are competing in this event. Also, I want to thank everyone for their hard work, support, volunteerism and participation. The experiences and the learning that you gain this weekend will last throughout your lives.

Sincerely,

Frank O. Klegon
2012 President
SAE International
Concept of the Competition

The Formula SAE ® Series competitions challenge teams of university undergraduate and graduate students to conceive, design, fabricate and compete with small, formula style, autocross racing cars. 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 120 teams from colleges and universities. 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 autocross racer. 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 and the prototype vehicle should actually cost below $25,000. 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 three days, the cars are judged in a series of static and dynamic events including: technical inspection, cost, presentation, and 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 Report: 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 Report: 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 fake manufacturing firm that the team’s design best meets the demands of the amateur weekend autocross racing market and that it can be profitably manufactured and marketed.

DYNAMIC EVENTS:
Acceleration: The race 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.

Skidpad: 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 economy, reliability – the cars have to prove it all.

THE FOLLOWING POINTS ARE POSSIBLE:

<table>
<thead>
<tr>
<th>Event</th>
<th>Points</th>
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<tbody>
<tr>
<td>Static Events</td>
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<tr>
<td>Presentation</td>
<td>75</td>
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<tr>
<td>Design</td>
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<tr>
<td>Cost Analysis</td>
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<td>Dynamic Events</td>
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<td>Acceleration</td>
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<td>Skid-Pad</td>
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<td>Autocross</td>
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<td>Fuel Economy</td>
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<td>Endurance</td>
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<td>TOTAL POINTS</td>
<td>1000</td>
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2012 Formula SAE® Michigan

Schedule of Events

(Subject to change)

**TUESDAY, MAY 8**
6:30 - 9:30 p.m. Early Registration in Brooklyn Super 8 Motel (155 Wamplers Lake Road; M-50 & Wamplers Lake Road)

**WEDNESDAY, MAY 9**
10:00 a.m. Tech Inspection “Take-a-Number” opens
5:30 p.m. Honda’s Welcome Ceremony in Main Tent (Open to Students/Faculty/Volunteers)
6:00 p.m. – 6:20 p.m. Captains & Advisors Meeting in Main Tent
6:00 p.m. – 8:00 p.m. MSC Software Reception by Invitation Only
7:30 p.m. Official Closing of the Site
8:00 p.m. EVERYONE MUST BE OFF-SITE

**THURSDAY, MAY 10 (ALL TIMES PRECEDED BY “~” ARE APPROXIMATE)**
8:00 a.m. Drivers Meeting (Brake & Noise) in Main Tent (MANDATORY)
8:30 a.m. - 5:00 p.m. 1st Round Design Judging Open in G3
9:00 a.m. - 5:00 p.m. Cost Judging Open in Main Tent
9:00 a.m. - 5:00 p.m. Presentation Judging Open in Suites
12:00 p.m. - 1:00 p.m. LUNCH BREAK (Main Tent)
~2:00 p.m. - 3:30 p.m. First Autocross Course Walk (weather permitting)
5:00 p.m. Push Bar Finalist Teams announced (up to 5 teams)
5:30 - 8:30 pm Design Judges Meeting (Judges Only)
5:00 p.m. Staging for Panoramic Photograph (Tentative; contingent upon weather)
6:00 p.m. Drivers Meeting (ALL Dynamic Events) in Main Tent (MANDATORY)
7:30 p.m. Official Closing of the Site
8:00 p.m. EVERYONE MUST BE OFF-SITE
~9:00 p.m. Design Finalists announced online

**FRIDAY, MAY 11 (ALL TIMES PRECEDED BY “~” ARE APPROXIMATE)**
8:30 a.m. Course Worker Safety Briefing (Acceleration & Skid-Pad) on Track (MANDATORY)
9:00 a.m. - 4:00 p.m. Design Feedback Sessions for Non-finalist teams in G3 (By Appointment)
9:00 a.m. - 12:30 p.m. Acceleration Event and Skid-Pad Events Open (Electric Car Demo near end of events)
9:30 a.m. Presentation Seminar in Main Tent
12:30 p.m. Honda Sponsored Lunch (student teams only)
~1:30-1:40 p.m. Driver’s Meeting at Start Line of Auto-X, Dynamic Area, (MANDATORY for drivers)
1:35 p.m. Autocross Course Worker Safety Briefing on Track (MANDATORY)
~1:40 – 2:00 p.m. Autocross Course Walk (Exact time will be announced)
2:00 p.m. - 5:00 p.m. Autocross Event Open (Electric Car Demo at beginning of event)
~5:30 p.m. - 8:30 p.m. Design Finals in G3
~7:00 p.m. Friday Award Ceremony in Main Tent
8:30 p.m. Official Closing of the Site
9:00 p.m. EVERYONE MUST BE OFF-SITE
SATURDAY, MAY 12 (ALL TIMES PRECEDED BY "~" ARE APPROXIMATE)

7:00 - 8:00 a.m. .................Endurance Course Walk
8:30 a.m. ..........................Course Worker Safety Briefing (Ford Endurance) on Track (MANDATORY)
~8:30 am   ...........................Top 3 Design Finalists Announced & Finish Order of Other Design Finalists
         Released
~9:00 a.m. - 2:00 p.m. ........Design Event Feedback, Including Finalists not in Top 3 Sessions in G3 (By
         Appt.)
9:00 a.m. .................Ford Endurance Opens for Group 1
~12:00 p.m. ....................Ford Endurance Line Closes for Group 1 (All Group 1 Cars off Track by
         12:30 p.m.)
~12:30 p.m. - 1:50 p.m. ....Endurance Course Walk
~12:30 p.m. ........................LUNCH BREAK (Main Tent)
1:30 p.m. ..........................Course Workers Back on Track
~1:30 p.m. ..........................Ford Endurance Opens for Group 2 (Electric Car Demo near end of event)
~4:00 p.m. ........  .................Ford Endurance Gate Closes for Group 2 (earlier if no cars in line).
~6:00 pm .............................Public Design Review of Top 3 Design Finalists in G3
~7:00 p.m. ...........................Presentation Highlights in Main Tent
~ 8:00 p.m. ..........................Final Award Ceremony in Main Tent
10:30 p.m. ..........................Official Closing of the Site
11:00 p.m. ..........................EVERYONE MUST BE OFF-SITE; All Teams and Transporters Must Exit

SUNDAY, MAY 13

9:00 a.m. - 2:00 p.m. .......... Site Open ONLY for Pick-Up of Transporters

DAILY OPERATIONS:

» MIS Site Open:
  • Wed. - Fri. – 7:30 a.m. - 7:30 p.m.
  • Sat. – 7:00 a.m. - 10:30 p.m.

» Student Registration Open:
  • Wed. - Fri. – 8:00 a.m. - 4:30 p.m.

» Career Center (Recruiting):
  • Throughout the competition

» Tech Inspection Open:
  • Wed. – 2 p.m. - 7 p.m. (no new cars after 6:00 p.m.)
  • Th. – 9 a.m. - 5 p.m.
  • Fri. – By appt. 9 a.m. until 5:30 p.m.
  • Sat. – By appt. 9 a.m. until 1p.m. Sat. (Re-tech only)

» Scales Open:
  • Wed. – 3 p.m. - 7 p.m.
  • Th. – 8 a.m. - 4 p.m.

» Tilt/Noise/Brake Open:
  • Th. – 9 a.m. - 5 p.m. (30 min. staggered opening)
  • Fri. – 9 a.m. - 5:30 p.m.
  • Sat. – By appointment until 1 p.m.

» Fuel Station Open:
  • Th. – 8:30 a.m. - 5 p.m.
  • Fri. – 8 a.m. - 5 p.m.
  • Sat. – 7:30 a.m. - 6 p.m.

» Practice Area Open:
  • Th. – 10 a.m. - 5 p.m.
  • Fri. – 9 a.m. – 5:30 p.m.
  • Sat. – 8:00 a.m. - 3 p.m.

NOTE: Cars must complete all 3 parts of tech by 5:30 p.m. Friday to qualify for Endurance
30 minutes’ notice required for all appointments, which can be booked via the announcer in Main Tent.
NOTES

- The site is closed to all teams Monday, May 14, 2012.
- Teams may enter the site with their rigs/trailers/panel trucks ONLY when there are no Dynamic Events running.
- Push Bar Comp. - Judging in scale bay as cars are weighed. Winner announced at Friday Award Ceremony.
- There will not be a First Aid Station on site. EMS will provide any/all medical attention.
- Overnight removal of vehicles is allowed, but tech must first pull Part 1 of your tech sticker.
- All teams not shipping cars must remove vehicles, etc. from the site no later than 2:00 p.m. Sun., May 13, 2012.
- Teams shipping cars must have them picked up and removed from MIS by 10:00 a.m. Monday, May 14, 2012.
- Announcements can be heard via FM radio (frequencies will be posted in G1 at event).
- Event Closing Times - Acceleration, Skid-Pad and Autocross close exactly at the scheduled time. Your car must cross the starting line before the event closing time in order to be allowed to complete that run.
- The F1 in Schools High School Engineering Competition will be held Fri. & Sat., May 11 & 12 in the Michigan Room, ground level of South Suites. FSAE participants are invited to observe this competition from 11 a.m.-12:30 p.m. & 1-5 p.m. Friday, and 9-11 a.m. Saturday.
- The Electric Vehicle Demos will be run during dynamic events for promotion of 2013 FSAE Lincoln Electric Class. Cars can be viewed in Team Paddock Area.

SUPPORT SERVICES

- Ambulance on site:
  - Wed. – Sat. – 7 a.m. - ~8 p.m.
- MIS Fire trucks on site:
  - Wed. – Sat. – 7 a.m. - ~8 p.m.
- Lincoln Electric Welding:
  - Wed. – 12 p.m. - 5 p.m.
  - Th. - Fri. – 8 a.m. - 5 p.m.
  - Sat. – 8 a.m. - 12 p.m.
- GM Machine Trailer:
  - Wed.-Fri. – 9 a.m. - 5 p.m.
- Goodyear & Hoosier:
  - Wed.-Fri. – 7 a.m. - 5 p.m.
  - Sat. – 7 a.m. - 3 p.m.
- Land & Sea Dyno:
  - Th.-Fri. – 9 a.m. - 5 p.m.

* As business dictates. May close earlier if deemed appropriate.

ADDITIONAL SERVICES

- Information (G1):
  - Th.-Sat. – 7:30 a.m. - 6 p.m.
- SAE Bookstore:
  - Wed. – 2 p.m. - 6 p.m.
  - Th. - Fri. – 8 a.m. - 5 p.m.
  - Sat. – 8 a.m. - 12 p.m.
- Concessions:
  - Wed.-Sat – 8 a.m. - 6 p.m.*

* As business dictates. May close earlier if deemed appropriate.
Finds coffee.

Makes donuts.

THE NEW 2013 MUSTANG GT
Available SYNC® with voice-activated Navigation System.
8-inch screen. Recognizes 10,000 commands. Hands-free calling.
Unleash your inner Mustang at ford.com/mustang

Closed course. Professional driver. Do not attempt.
2011 Formula SAE®
Competition Awards

STATIC EVENTS

SAE ENGINEERING DESIGN AWARD
Top 3 team scores in Design – Trophies plus 1st will receive 1 day K&C testing at Goodyear Facility in Akron, OH sponsored by Goodyear.

SAE COST AWARD
Top 3 team scores in Cost - Trophies

SAE PRESENTATION AWARD
Top 3 team scores in Presentation - Trophies

DYNAMIC EVENTS

FORD FUEL ECONOMY AWARD
Top 3 teams that receive best Fuel Economy Score - $1500, $1000, $500

SAE ACCELERATION AWARD
Top 3 team scores in Acceleration - Trophies

FORD ENDURANCE AWARD
Top 3 team scores in Endurance- $1500, $1000, $500

SAE SKID PAD AWARD
Top 3 team scores in Skid Pad - Trophies

SAE AUTOCROSS AWARD
Top 3 team scores in Autocross. Trophies plus 8 free tires, 6 free tires, 4 free tires sponsored by Hoosier Tire.

OVERALL

SAE SPIRIT OF EXCELLENCE AWARD
This award recognizes the top ten (10) finishers overall. - $3000, $2000, $1000, trophies

SPECIALITY AWARDS

ALTAIR ENGINEERING’S WILLIAM R. ADAM ENGINEERING AWARD
Development of new and innovative design concepts for FSAE racing competition. - $1000, $500

THE FEV POWERTRAIN DEVELOPMENT AWARD
This award is intended to reward the top three Formula SAE teams for overall excellence in Powertrain development. - $2000, $1000, $500

AUTODESK/ASBE BODY DESIGN AWARD
This award recognizes top two body designs; one each for Monocoque and Body on Frame - $1000, $1000

CHIEF DESIGN JUDGE BEST THREE VIEW DRAWING AWARD
Best execution of three view drawings submitted with a Design Report – Engineering handbooks

Meet Nassim. She's doing some pretty cool design work at the University of California, Davis. She knows being a great designer isn't easy, but also knows the more you explore, the more you discover, and the better you get. And she never stops in her quest to shock the world.

To find out more about Nassim’s project and get free Autodesk software to help you start blazing your trail, visit www.autodesk.com/inspiringstudents.
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Silver Partner

Bronze Partner

T-Shirt Sponsor

Friends of Formula
### 2012 Formula SAE Michigan Registered Teams

#### Austria
- 004 Graz University of Technology

#### Canada
- 011 Ecole de Technologie Superieure
- 024 Universite de Sherbrooke
- 025 University of Toronto
- 031 Lakehead University
- 033 University of Victoria
- 036 University of Waterloo
- 047 Dalhousie University
- 048 Concordia University Montreal
- 056 Ryerson University
- 063 Ecole Polytechnique Montreal
- 064 University of Manitoba
- 069 University of Ontario Institute of Technology
- 070 Cegep du Vieux-Montreal
- 073 Universite Laval
- 078 McGill University
- 085 Sheridan College
- 087 University of Windsor
- 093 Universite Du Quebec at Trois-Rivieres
- 096 University of Guelph
- 105 Queen’s University
- 111 University of Western Ontario

#### Finland
- 118 Metropolia University of Applied Sciences

#### Germany
- 002 Technical University of Munich
- 003 Universitat Stuttgart
- 014 Karlsruhe Institute of Technology
- 049 Friedrich Alexander University of Erlang
- 119 UAS Esslingen

#### Singapore
- 034 National University of Singapore

#### South Korea
- 042 Kookmin University
- 082 Kumoh National University of Tech

#### United States

##### Alabama
- 039 Auburn University
- 103 University of Alabama

##### California
- 050 San Jose State University
- 095 University of California – Merced

##### Colorado
- 017 US Air Force Academy

##### Connecticut
- 037 University of Hartford
- 124 Central Connecticut University
- 127 University of Connecticut

##### Florida
- 013 University of South Florida
- 020 University of Central Florida
- 029 University of Florida
- 090 University of North Florida
- 110 Florida Atlantic University
- 121 Florida International University

##### Georgia
- 067 Georgia Institute of Technology
- 068 Southern Polytechnic State University
- 115 Georgia Southern University

##### Illinois
- 051 University of Illinois at Urbana-Champaign
- 075 Northwestern University
- 101 Northern Illinois University
- 102 Bradley University
- 117 Southern Illinois University at Carbondale

##### Indiana
- 021 Rose Hulman Institute of Technology
- 022 Purdue University-West Lafayette
- 114 University of Evansville

##### Kansas
- 009 University of Kansas
- 077 Kansas State University

##### Kentucky
- 091 University of Kentucky

##### Louisiana
- 041 Louisiana State University

##### Massachusetts
- 066 Massachusetts Institute of Technology
- 083 Worcester Polytechnic Institute

##### Maryland
- 015 US Naval Academy

##### Maine
- 084 University of Maine

##### Michigan
- 006 University of Michigan Ann Arbor
- 027 Michigan State University
- 035 Oakland University
- 054 University of Michigan Dearborn
- 055 Western Michigan University
- 060 Ferris State University
- 122 Lawrence Technological University
- 123 Kettering University

##### Minnesota
- 032 University of St Thomas
- 081 St Cloud State University
- 108 University of Minnesota Twin Cities

##### Missouri
- 044 Washington University St Louis
- 045 Missouri University of Science and Tech
- 107 University of Missouri

##### Mississippi
- 088 Mississippi State University

##### North Carolina
- 059 North Carolina State University
- 089 Duke University
- 100 North Carolina A&T State University

##### New Hampshire
- 052 University of New Hampshire

##### New Jersey
- 058 Rutgers University
FEV is a playground for creative engineers. We help our customers innovate new concepts from emobility to greener engines to wind power generation. We’re constantly pursuing new ideas – redefining “possible” every day. If you dream of creating the future, join us and shift your career into Überdrive.
The Global Formula Racing Team is a partnership between Oregon State University and the Duale Hochschule Baden-Württemberg Ravensburg. The two universities share intellectual, physical and financial resources to create a highly competitive team.

For 2012 the team has again designed one combustion and one electric vehicle, GFR12c and GFR12e respectively.

After Michigan, both cars will compete in Formula Student Austria and Formula Student Germany.

In October 2010 a team of 36 young and motivated students started to develop the 8th car of the TU fast Racing Team. And after a lot of hard work we were proud to roll out the nb011 out of or shop in May 2012. In addition to a well designed car, last year’s season showed that a lot of car concepts can do well at a FSAE competition, as long as it is easily maintainable and reliable. So the challenge of 2012 was to build a well engineered and reliable car. Regarding that we came up with some good ideas for interesting parts for the nb011 and we are looking forward to Formula Student 2012. So now, we are excited to compete with all the other teams and get to know if we did a good job. And after a hard day full of work, we would be happy to chat with some of you guys about our favorite theme and having a good time. Just come over and visit us.

**Global Formula Racing Team**

- **BRAKE**: Brembo front calipers/AP Racing rear calipers/ductile iron rotors
- **BSCD**: 95 mm / 62.1 mm / 449 cc
- **COOLING**: Side mounted oil and water cooler
- **DRIVE**: Modified Drexler limited slip
- **ELECTRONICS**: MoTeC M400, ACL, 2 VIMs
- **ENGINE**: Honda CRF450X
- **FR/RR TRACK**: 1145 mm front, 1145 mm rear
- **FRAME**: CFRP Monocoque with steel roll hoops
- **FUEL SYSTEM**: RP fuel tank, single coaxial injector
- **FUEL TYPE**: 93 octane
- **MATERIAL**: Toray T800H-6K PW/3900 Plain Weave, Hexcel nomex honeycomb
- **MPD**: 36 kW (9100 RPM)
- **MPT**: 38 Nm (9100 RPM)
- **OLWH**: 3100 mm long, 1330 mm wide, 1327 mm high
- **SUSPENSION**: Double unequal length A-arms. Pull/push rod actuated spring and damper
- **TIRE**: Hoosier R25B 18.0x7.5-10
- **UNIQUE**: German-American heritage
- **WEIGHT**: 224 kg
- **WHEELBASE**: 1555 mm

**TU Fast Racing Team**

- **BRAKE**: 4-Disk system, floating drilled rotors, ISR calipers, adjustable balance
- **BSCD**: 67.0mm / 42.5mm / 599ccm
- **COOLING**: Custom radiator in sidepod, electrical pump, student designed control unit
- **DRIVE**: Drexler clutch pack limited slip differential w/ internal preload adjustment
- **ELECTRONICS**: Custom multifunctional steering wheel, electropneumatic shifting, Motec ADL3
- **ENGINE**: 2007 Kawasaki ZX-6R
- **FR/RR TRACK**: 1204mm/1124mm
- **FRAME**: CFRP Monocoque with tubular steel rear space frame bolted to Monocoque
- **FUEL SYSTEM**: Student designed fuel injection system using Motec M800 ECU
- **FUEL TYPE**: 100 octane unleaded gasoline
- **MATERIAL**: prepreg laminate w/ alu-honeycomb sandwich, 1.4462 tubing
- **MPD**: 12000
- **MPT**: 10000
- **OLWH**: 2790mm/1396mm/1034mm
- **SUSPENSION**: Double unequal length A-Arm. Pullrod actuated horizontal spring and damper
- **TIRE**: FR: 178x54 R13, Hoosier R25B / RR: 191x47 R13, Hoosier R25B
- **UNIQUE**: Augustiner-holder
- **WEIGHT**: 564lb
- **WHEELBASE**: 1610mm
VISIONARIES WELCOME
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INDIVIDUALITY RESPECTED
ACCOMPLISHMENTS ROUTINE

Honda is an equal opportunity employer and we are accepting applications now!

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www.corporate.honda.com
Since the foundation in 2005 the Renntam Uni Stuttgart has always been striving for winning the attended competitions. Already having gained two overall podium finishes (2nd and 3rd) during the past events at the Michigan Speedway, the Rennteam is determined to finally achieve overall victory in this year’s Formula SAE Michigan.

With organized teamwork, passion and clear goals we built the F0711-6, our sixth car. The powertrain, a four-cylinder Honda engine, is installed in an open tubular spaceframe to achieve a good maintainability. This rear frame is attached to a CFRP-monocoque providing a high level of safety for the driver. Strapped into an ergonomically formed seat, the driver can adjust the pedal box to get the best possible control over the vehicle. A low level of compliance and a high stiffness in the chassis also contribute to a well performing car on the track. By an intensively used testing period we tried to get the full potential out of the car in terms of both dynamic performance and reliability.

The Team is well-prepared and looking forward to confirm its achievements in the FSAE event.

Regarding the potential of our last year’s car, we decided to make the Tankia 2012 an evolution of its precursor. Behind his aggressive but also elegant appearance the Tankia 2012 is hiding a lot of highly sophisticated technical solutions. With a weight of less than 195 kg and an engine which produces 96 hp and 72 Nm it has an outstanding power to weight ratio. It comes up with a carbon fiber monocoque and a completely new designed carbon fiber space frame rear end, which is stiffer and makes it possible to remove the engine very quickly. Other highlights of the Tankia 2012 are the one-piece carbon fiber rims, hollow titanium uprights made by EBM technology, variable intake tube lengths and the self-developed multifunctional steering wheel, which gives the driver the chance to adjust brake balance and other things during driving. Our Team consists of 39 ambitious members and is divided into four technical (chassis, electronics, powertrain, suspension) and two non-technical departments (marketing, IT).
In this interactive web series, SolidWorks brings together CAD fanatics from around the world to collaborate on innovative design projects. With their help, our host Jeremy Luchini successfully designed the first hardcore baby buggy for dads. Watch its development from design to build - and how SolidWorks was used to bring ideas, comments and your votes to life at LetsGoDesign.tv.
For 2012 the University of Wisconsin- Madison looks to improve on their 2011 finish. Through the use of aerodynamics, a heavily modified 605cc forced induction single cylinder, and refined chassis kinematics the WR-212 is poised to be the most competitive car in Wisconsin Racing's 22 year history.

Wisconsin Racing would like to give special thanks to our sponsors:

Diamond: The United Wisconsin Grain Producers

Platinum: The Wisconsin Corn Promotion Board, Midwest Composite Technologies, Eric Gor's Forward Motion, Engineered Metal Products, Axon Systems, Craft Patterns, Black Stone Tek

Gold: Baum Machine, QMI, Reuther, Mercury, Trim-Tex Drywall Products, Machining, Isthmus Engineering, Bosch, C-Ideas, Ricard

As well as our Silver and Bronze sponsors listed at www.uwracing.com

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In 1999 Zips racing scored their first championship at an SAE event. Since then the team has been working hard to find their way back to the podium in Michigan. 2011 proved to be a huge success for Zips Racing. Having the opportunity to compete in the United States, Austria, and Germany the team has gained a vast amount of knowledge, which has been carried over to the 2012 season. With high exceptions and passion for 2012, the team has set their sights on placing in the top 5 overall at all competitions they compete in. See you at the starting line!

Special thanks to all of the 2012 Zips Racing sponsors, we couldn’t have done it without you!!!
The team was founded in 1994 by a group of six KU mechanical engineers. Since then, the team has grown into a team comprising of 36 undergraduate seniors and over 20 volunteers. Team members represent several disciplines including mechanical engineering, chemical engineering, electrical engineering, industrial design, and business.

The Jayhawk Motorsports Formula SAE team (JMS) has a longstanding history of success in competition including 2nd, 3rd, 4th, and 5th place overall finishes. Following a 9th place overall finish and 1st place autocross finish in 2011 at Michigan, the University of Kansas Formula SAE team has designed an improved and highly competitive 2012 racecar.

Jayhawk Motorsports uses an array of computational analysis and physical testing techniques to design a vehicle with high performance capabilities. Engineering begins by determining target suspension. Suspension hardpoints are then finalized using kinematics software. Flow simulation is utilized for aerodynamic flow simulation and experimental data is collected through full scale wind tunnel testing. A full car model was also created in SolidWorks to predict weight, CG, and moments of inertia.

**BRAKE**: Brembo 2 Piston Calipers, Ductile Iron Rotors, Bespoke Master Cylinders
**BSCD**: 67mm bore / 42.5mm stroke / 4 cylinder / 599 cc
**COOLING**: Water Cooled, Single Radiator, Single Fan
**DRIVE**: Chain Drive
**ELECTRONICS**: Life Racing F88 ECU
**ENGINE**: Honda CBR600RR
**FR/RR TRACK**: Front: 48in (1219.2mm), Rear: 46in (1168.4mm)
**FRAME**: Composite Monocoque
**FUEL SYSTEM**: Student Manufactured and Return System
**FUEL TYPE**: E-85 Ethanol
**MATERIAL**: Composite Monocoque
**MPD**: 11000rpm
**MPT**: 9000rpm
**OLWH**: L: 127in (3225.8mm), W: 55.5in (1409.7mm), H: 54.2in (1376.68mm)
**SUSPENSION**: Double Unequal Length A-Arm, Pull/Push Rod Actuated Spring and Damper
**TIRE**: 20.5 x 7 – 13 R25B Hoosier
**UNIQUE**: Aerodynamic Package
**WEIGHT**: 590lbs (267.6kg)
**WHEELBASE**: 65in (1651mm)

The F2012 design is based on ambitious competition objectives. The chosen solution is a compact, lightweight, fuel efficient racecar designed using a numerical approach backed by extensive experimental validation.
F2012 represents the seventh Formula SAE vehicle produced by USF Racing since 2005. It is a pure evolution of F2011, USF Racing’s previous car. The following goals were identified at the beginning of the design process: reduce the weight by 20lbs from last year’s model, strong focus on ergonomics, and improving in the areas in which F2011 lacked. F2012 runs a naturally aspirated Suzuki LT-R450 450cc single cylinder engine, carbon fiber drive shafts, and 10 inch wheels. We successful integration of last year’s knowledge into this year’s design goals, we hope to design, manufacture, and compete with a vehicle which is aggressive in all aspects of the FSAE competitions.

We would like to thank all of our sponsors for the vast commitment to our team.

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Being a team of about 50 students, KA-Racing builds two cars every year: one for the formula student and one for the formula student electric. Starting in autumn with conception and design, we set a tight production schedule to present our new cars in April. Since then we have tested a lot to get ready to race and train our drivers. The KIT 11, our 5th combustion car, and combines the best of new ideas and approved concepts. One of the highlights is the hybrid chassis with a CFRP monocoque front end and a tubular space frame rear end. To facilitate the handling with the KIT 11, we also improved our ergonomics. The modular electronic system has been completed with a live telemetry system to observe all dates while driving. After successful competitions in Europe, our aim is to score as much points as possible and achieve a top ranking overall. We would like to thank all supporters who made this possible and are looking forward to the FSAE Michigan event.
The 2012 Navy FSAE car continues off the success of the 2011 team’s prepreg carbon fiber/aluminum honeycomb front monocoque by coupling it with a lightweight 450cc engine to reduce the weight of the car to around 400 pounds. The single cylinder engine reduced the size of the rear frame allowing it to be smaller and lighter while still providing ample room for other components. Light weight was the goal this year, so the car is very minimalistic allowing the small displacement engine to propel the car at about the same rate as its heavier four-cylinder equipped brother from last year. With few exceptions, each student on the team is a first year car builder comprised of mostly Mechanical Engineers, a General Engineer and three Systems Engineers. As such, the team was able to bring together multiple disciplines and incorporate a greater number of new components never before seen in a Navy entry. Upon graduation, each student will be commissioned into either the United States Navy or Marine Corps as Aviators, Surface Warfare Officers, Submariners and Ground Officers on May 29th.

Based on the previous year experience and to keep improving our results, this year the F-SAE USB team has set to design and build a Functional, Achievable, Simple, Tested and Economic car. We want to keep going FASTER to continue being the best Latin American Team.

Our main design goals for this year are: Increase torsional stiffness without compromising the overall weight and rotational inertia, increase the self-manufactured and own design parts in order to decrease cost. Gain a maximum advantage of tire performance by improving suspension geometry based on analysis of last year design. Improve under tray design to give a superior aerodynamic efficiency, also the prototype has advanced electronic integrate dashboard into the steering wheel, develop our own data logging system and improve the wiring distribution.
The 2011-12 University of Central Florida’s Formula SAE Team has used the momentum it has gained from last year to continue to improve designs for this coming year. Using an evolutionary design approach, we have been able to improve on previous designs as well as forge our own paths in design.

This year, there have been major improvements involving both the suspension and the engine. This is due to a greater knowledge in the area and new resources we haven’t had before. We have also still been continuing to lose weight in all components, improving the performance of the vehicle. New to the car is a pneumatic paddle shifter, which allows the driver to be more comfortable, and is also a more intuitive system for the driver.

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Rose Grand Prix Engineering presents Dainty Dan, a car that showcases engineering design and fresh ideas.

Designs incorporate decades of racing experience, utilizing race proven designs from formula cars past and present.

Engine development relied heavily on Ricardo WAVE, the same software Ford used to develop their new 5.0 masterpiece. A peak engine power increase of nearly 40% coincide with a wider powerband to validate the engine team’s computer modeling.

Using lessons and data from our previous car, the suspension has been optimized to make this car a handling dream. Video footage and driver feedback was used to optimize suspension kinematics. Strain gauges used on last year’s suspension gave insight to dynamic loads. FEA was used to reduce unsprung weight and to make components, such as the suspension rockers, true works of art.

Weight was obsessively shaved from the vehicle bringing Dainty Dan to fighting weight. Weight was shaved from non-structural members to reduce mass without sacrificing strength, durability, or reliability. Our battery choice alone reduced weight by a stunning 10 lbs over a conventional lead-acid battery.

Rose GPE is proud of our work.
Purdue University's entry for the 2012 season is an evolution of the designs developed over many years. Through careful consideration of components and layout, refinement was made only where design change could be proven beneficial to overall vehicle performance. This was done through theoretical and computational analysis as well as empirical testing. The overall vehicle analysis focused on suspension, chassis, powertrain, aerodynamics, electronics, and drivetrain systems as well as the way in which each system will interface.

In the spirit of the competition, our team targets the market of newcomers to open-wheel autocrossing. The needs expressed by this market are to have a vehicle that maximizes the learning curve of the driver while remaining affordable. In the autocross world, racers are their own engineering team and their own mechanics so the vehicle must be as simple as possible. Simply put, FSS Racing’s design goals in order of priority for the F2012 are an easy to drive, easy to adjust, affordable, reliable and easy to repair Formula SAE car.

**Purdue Univ - W Lafayette**

**Purdue Formula SAE**

**Universite de Sherbrooke**

**FSS Racing**

**BRAKE**: Custom Cross-Drilled Rotors  
**BSCD**: Front: Wilwood PS-1 Calipers Rear: AP CP4226 Calipers  
**COOLING**: Student Built  
**DRIVE**: Drexeler Formula Student Differential  
**ELECTRONICS**: Motec M400  
**ENGINE**: Honda F4i  
**FR/RR TRACK**: 48inch/48inch  
**FRAME**: 4130 chromoly steel  
**FUEL SYSTEM**: Student Built  
**FUEL TYPE**: 93  
**MATERIAL**: Aluminum  
**MPD**: 85  
**MPT**: 45  
**OLWH**: 115inch, 56.5inch, 39inch  
**SUSPENSION**: 4-Wheel Independent, Pull Rod, Fully Adjustable, Custom Tuned Shocks  
**TIRE**: Goodyear 20.0×7.0 -13 in. Racing Slicks  
**UNIQUE**:  
**WEIGHT**: 588  
**WHEELBASE**: 62.5inch

**BRAKE**: Floated rotors, Wildwood front calipers, AP Racing rear calipers  
**BSCD**: 77mm / 53.8mm / 2 / 500 cc  
**COOLING**: Water cooled with one radiator  
**DRIVE**: Performance BRP CVT with custom reducer  
**ELECTRONICS**: AEM ECU  
**ENGINE**: Yamaha Genesis 80fi  
**FR/RR TRACK**: 48” (1219mm) / 46”(1168mm)  
**FRAME**: 4130 Chromoly steel space frame  
**FUEL SYSTEM**: Electronic Fuel Injection  
**FUEL TYPE**: Octane 100  
**MATERIAL**: Fiber glass bodywork  
**MPD**: 80 HP (60 kW) @ 10 000 rpm  
**MPT**: 42 ft. lbs (57 Nm) @ 9 500 rpm  
**OLWH**: 80” (2040 mm) / 55” (1400 mm) / 43” (1102 mm)  
**SUSPENSION**: Separated Roll and Rate (Damped Mono-Shock)  
**TIRE**: 13” (330 mm) Goodyear D2696  
**UNIQUE**: SRR Suspension  
**WEIGHT**: 640 lbs (291 kg)  
**WHEELBASE**: 60.5” (1537mm)
The University of Toronto presents UT12 for the 2012 Formula SAE competition. The past 15 years of experience have culminated into this design; focused on reliable high performance. UT12 is Toronto’s first 10” wheel vehicle featuring newly designed welded aluminum uprights and 6061-T6 hubs. 2012 is the fourth installment of the Honda TRX450 motor modified to increase volumetric efficiency by 7% while increasing broad range torque output over UT11. Design features include a high compression piston, reduced transmission gears and thermal coated stepped exhaust header. Focus was placed on creating a robust fuel/ignition map to ensure reliable operation during the testing and competition seasons. The UT12 chassis has evolved from the successful 2011 spaceframe. Chassis weight has been reduced to 24kg and represents Toronto’s highest stiffness to weight ratio. By effectively using all four mandated bulkheads the simplified tube frame efficiently packages all components resulting in a vehicle with no overhung mass and an overall length of 2254mm.

With our strong history in FSAE/FS competition we look to build off our successes at FSG11 and fight for the championship in Michigan.

Lafayette College Formula SAE is a fourth year team competing in the Formula SAE Michigan competition. Improving upon past successes and mistakes, the 2012 Lafayette College Formula Team has engineered a much improved car. The new car will provide the foundation for improvements in performance, handling, ergonomics, and acceleration.

The ultimate goal for the 2012 design was to drastically reduce the weight while maintaining reliability. Reliability has been a cornerstone of all previous cars, and it was important to uphold this design principle on the new car.

The design was finalized in accordance with all rules set forth by Formula SAE. Other significant goals included reducing the size of the car, improving the ergonomics, and organizing the electrical subsystem for increased reliability.
Michigan State University's 2012 Formula SAE Car, Car 27, represents the team's return to a carbon fiber monocoque chassis. Large considerations for driver ergonomics, drivability, and reliability have Car 27 promising to be an outstanding competitor in this year's competition. Returning as the vehicle powerplant, the well developed Honda CBR F4i has equipped Car 27 with the most powerful engine in MSU's history. Unique attributes include a redesigned cooling system, the introduction of the Drexler FSAE LSD, and an electro-pneumatic paddle shifting system capable of producing shifts in 80 ms. The team has returned a strong core of dedicated members who all have high expectations for FSAE Michigan.

We would like to thank Michigan State University and all of our sponsors, friends and family for their kind contributions and support!

**Michigan State Univ**  
*Michigan State University*

This year marks the University of Florida's 22nd entry in Formula SAE. UF's F-12 is the third iteration of a platform that puts strong emphasis on ergonomics, and serviceability while providing a reliable, confidence-inspiring car with great value to the weekend autocrosser. New to the F-12 is an aerodynamic undertray, that when combined with a newly-redesigned push rod actuated suspension, allow the F-12 to achieve significant improvements in lateral performance over its predecessor.

In remembrance of Khalil Mohmed.

**Univ of Florida**  
*Gator Motorsports*

| **BRAKE** | Wilwood PS-1, dual piston. Sintered metallic compound pads. Tilton 77 MC |
| **BSCD** | 67mm bore / 42.5mm stroke / 4 cylinder / 599 cc |
| **COOLING** | Single front-ducted, sidepad mounted radiator (2) 13.2cm shroud-mounted fans |
| **DRIVE** | 520 Non-O-ring Chain |
| **ELECTRONICS** | Motec M400 with ADL upgrade |
| **ENGINE** | Honda CBR 600 F4i |
| **FR/RR TRACK** | 1194mm/1194mm |
| **FRAME** | Full carbon fiber monocoque with rear steel tube sub-frame |
| **FUEL SYSTEM** | Sequential fuel injection, Bosch FP100 pump, Stock Honda FP Reg |
| **FUEL TYPE** | 93 Octane |
| **MATERIAL** | The stuff dreams are made of. |
| **MPD** | 11000 |
| **MPT** | 9500 |
| **OLWH** | 2491mm x 1367mm x 1069mm |
| **SUSPENSION** | Double unequal length A-Arm, push rod actuated spring and damper |
| **TIRE** | 20x7.0-13 R25B Hoosier |
| **UNIQUE** | Electro-pneumatic Paddle Shifting System, Onboard Wireless Telemetry |
| **WEIGHT** | 590 lbs |
| **WHEELBASE** | 1588mm |

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| **BRAKE** | Floating, hub-mounted steel rotors |
| **BSCD** | 67mm bore / 42.5mm stroke / 4 cylinder / 599 cc |
| **COOLING** | Ducted left side mounted radiator, with PWM water and fans |
| **DRIVE** | 520 chain, modified torsen differential |
| **ELECTRONICS** | Motec M400 ECU, ADL, PDM |
| **ENGINE** | 2007 Honda CBR600RR |
| **FR/RR TRACK** | 1219mm front, 1193mm rear |
| **FRAME** | 4130 steel tubular spaceframe |
| **FUEL SYSTEM** | Motec M400 fuel management system |
| **FUEL TYPE** | 93 Octane |
| **MATERIAL** |  |
| **MPD** | 11000 |
| **MPT** | 9500 |
| **OLWH** | 2491mm x 1367mm x 1069mm |
| **SUSPENSION** | Double unequal length A-Arm, push rod actuated |
| **TIRE** | 20x7.0-13 R25B Hoosier |
| **UNIQUE** | Externally-adjustable Kochler (TM) differential |
| **WEIGHT** | 264 kg |
| **WHEELBASE** | 1549mm |
Simplistic design with decisions based on a risk-potential analysis to extract the most out of the contact patch with a set amount of resources. Specific features include unsprung aero capable of high downforce at low speeds.

Steel frame, 13" tires, big wings, v-twin, manual clutch and shifter.

Lakehead University, located in Northern Ontario, Canada, will be competing with our fourth car, TWR-04. Designs are based on improving previous cars, and this year's car is a large improvement over TWR-03. With a new lightweight integrated package with significantly lower center of gravity, and a newly acquired dynamometer for testing and tuning; Lakehead University looks to set its best results yet!
The University of St. Thomas presents its first entry to the Formula SAE competition this year after the team was founded in February of 2011. This car has been designed and built to be robust and reliable to help our team compete throughout all of the competition events.

With reliability and robustness in mind, our car features an all steel frame construction, double unequal length a-arm suspension and a Honda engine. The all steel frame provides a great base to our car by maximizing our torsional stiffness and allowing the suspension tuning to be independent of chassis flex. Different shock actuation in the front and rear provides similar, linear spring rates which ease the tuning of vehicle handling characteristics. Honda engines and reliability go hand in hand and which is why a Honda CBR 600rr engine was chosen. The CBR 600rr provides long power and torque curves along with good fuel economy and many tuning options. A Drexler LSD and 520 x-ring chain deliver this power and torque to the wheels.

We would like to thank the University of St. Thomas, all of our sponsors, and our friends and family for their continuing support.

The UVic Formula SAE Team started competing in Formula SAE in 2001, and has been striving for continuous improvement every year since. The past few years has taught the team the importance of organization, dedication, and seamless knowledge transfer.

This year’s car is focused on driver controls, overall car handling, and weight reduction. Particular attention was paid to having a complete and accurate model to ensure system integration. Key design features include an electronic actuated shifting system, and a student designed PCB integrating the MegaSquirt 3 engine management hardware.

We would like to thank all of our sponsors for their help and support this season. Without their contributions UV12 would exist only on paper.

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**University of St. Thomas**

**UST FSAE**

**Information published as supplied by teams on or before March 26, 2012**

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**Univ of Victoria**

**UVic Formula SAE**
The 2012 NUS FSAE Race Car was designed with regards to the following design goals:
1) Performance
2) Weight Reduction
3) Analysis Verification

In order to achieve these goals, specific importance was placed on tuning of the engine, lightening of all parts especially rotating components as well as physical verification of simulations and computer analysis used.

The car’s performance needed a huge boost in terms of the handling of the car in transients as well as giving the driver the confidence to push the car to its limit. The engine was also tuned for smoother power delivery to provide more predictable handling for the driver. With the use of the V-twin Aprilia SXV550 power plant, lightening of all components on the car was needed to increase the car’s acceleration capabilities due to generally lower peak torques in V-twin engines as compared to in-line 4 cylinder engines. Analysis verification was also needed so that inputs into computer analysis and simulations can be validated and designs can be further refined to result in better performance and weight savings.

Oakland University started the season and development of their 2012 entrant with a high level of enthusiasm following their best competition finish in the team’s 10 year history.

This enthusiasm was carried into summer in which the 2011 entrant captured Oakland’s third straight Detroit SCCA Solo class championship and was put through many hours of testing and tuning. During this time, more miles were logged on the 2011 car than any predecessor.

The saying, “To finish first, you must first finish” led Oakland University to adopt the primary goal of reliability during the 2009 season. In the following years, several iterations led to more compact, lighter, and more innovative systems. Improvements specific to the 2012 car include a new aerodynamic setup, custom engine management, pushbutton gear shifting system, redesigned steering wheel, pedals, and intake manifold.

Grizzlies Racing manifests performance, reliability, economy and driveability in this year’s vehicle package: GRx2.

The team would like to thank its sponsors and the University for their continued support. Without them it would not be possible to compete.

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**National Univ of Singapore**

NUS FSAE

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**Oakland University**

Oakland University Formula SAE

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**Brake**

- Floating rotors, 2-piston Brembo calipers

**BSCD**

- 67mm bore / 42.5mm stroke / 4 cylinders / 599cc

**Cooling**

- Dual side-mounted radiators with ECM controlled fan

**Drive**

- #520 pitch chain and sprocket

**Electronics**

- MoTeC M800 ECU

**Engine**

- Honda CBR 600 F4i

**FR/RR Track**

- 1245mm / 1194mm

**Frame**

- Tubular space frame

**Fuel System**

- Custom aluminium fuel tank, inline pump, EFI

**Fuel Type**

- 93 Octane

**Material**

- Steel, aluminium, CFRP

**MPD**

- 9450

**MPT**

- 7150

**OLWH**

- 2612 mm / 1272 mm / 1187 mm

**Suspension**

- Double unequal length A-arm, pushrod actuated spring and damper, U-type ARB

**Tire**

- 18.0 x 6.0 - 10 R25B Hoosier

**Unique**

- Electro-pneumatic clutch and gear actuation

**Weight**

- 249 kg

**Wheelbase**

- 1555 mm
F12 (Rachel) is the twenty-sixth entry from UW Formula Motorsports. It is marked by a focus revolving around Driver-centric design, Reliability and Serviceability.

For the third season, development continued on the 07+ Honda CBR600RR engine platform which delivers 70 kW and 72 Nm to the wheels. Development specifically focused on improving reliability of the overall engine package and driver interaction with the engine through the electro-pneumatic shifter and throttle controls.

Continuing development from past seasons, a tubular space-frame is used which has been deliberately designed around the driver. The frame and suspension were jointly designed with this goal in mind.

This racecar is the culmination of a year of effort for over 40 dedicated students. This season has been one of the most dynamic in the history of the team and we are looking forward to a competitive 2012 year.

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The 2012 University of Hartford Formula SAE Team is comprised of a group of extremely dedicated individuals who have spent significant time designing and manufacturing the 2012 car. The team has drawn upon our heritage of maintaining a lightweight and reliable car with extremely high build quality.

For 2012, the car’s chassis and suspension have been completely redesigned and improved. The chassis redesign has significantly reduced build time and the suspension improvements have increased the handling capabilities. Coming off of one of the team’s most successful finishes to date in 2011, the team heads into the 2012 competition with the simple goal of further improvement.

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**Univ of Waterloo**
University of Waterloo Formula Motorsports

**Univ of Hartford**
University of Hartford FSAE

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**BRAKE**: Outboard, Floating, Cast-iron rotor, ISR Front and AP Racing Rear caliper  
**BSCD**: 67.0mm x 42.5mm / 4 cylinder / 599.4 cc  
**COOLING**: One side mounted radiator  
**DRIVE**: #428 chain, custom Salisbury differential  
**ELECTRONICS**: Pectel SQ6 ECU, electro-pneumatic gear shifter  
**ENGINE**: 2007 Honda CBR600RR  
**FR/RR TRACK**: 1238 mm / 1200 mm  
**FRAME**: 4130 tubular steel spaceframe  
**FUEL SYSTEM**: 200 cc Denso fuel injectors, Walboro Pump, Fuel Lines  
**FUEL TYPE**: 93 Octane Gasoline  
**MATERIAL**: Now contains many...  
**MPD**: 70 KW @ 12000 rpm  
**MPT**: 72 Nm @ 8500 rpm  
**OLWH**: 2540 mm / 1415 mm / 1142 mm  
**TIRE**: 20.5x7.0-13 Hoosier R25B  
**UNIQUE**: 2 Cup Holders  
**WEIGHT**: 266 kg  
**WHEELBASE**: 1665 mm

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**BRAKE**: Inboard front floating Yamaha YFZ 450 calipers, single rear brake on diff  
**BSCD**: 98mm/68mm/1 Cylinder/513cc  
**COOLING**: Yamaha YFZ450 radiator and fan  
**DRIVE**: 420 O-Ring Chain  
**ELECTRONICS**: Performance Electronics PE-3 ECU  
**ENGINE**: Yamaha YFZ450 Single Cylinder  
**FR/RR TRACK**: FR: 1244mm/49in RR: 1206mm/47.5 in  
**FRAME**: 4130 Chromoly Tubular Space Frame  
**FUEL SYSTEM**: Performance Electronics PE3 Fuel Injection  
**FUEL TYPE**: 100 octane  
**MATERIAL**: 4130, aluminum, plastics  
**MPD**: 9000  
**MPT**: 7500  
**OLWH**: 2490mm/98in 1470mm/57.8in 1120mm/44in  
**SUSPENSION**: Unequal Length A-Arms, pullrod actuated bellcranks  
**TIRE**: Hoosier LCO 10" x 6"  
**UNIQUE**: Front inboard brake rotors  
**WEIGHT**: 550 lb (250 kg)  
**WHEELBASE**: 1752mm/69in

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Information published as supplied by teams on or before March 26, 2012
After a one-year hiatus, FSAE-UCV comes to FSAE Michigan 2012 with, in the words of our faculty, an almost re-founded team: a new group with new faces, renewed resolve and new ideas, supported by the same experience and institution that ran the team from 2004 to 2010.

Our goal for 2012 was to make a base prototype we could then improve for our top-25 target in 2013. For that our design philosophy revolved around flexibility, adjustability and improvability.

Overall the design is an evolution of the team’s last car: suspension, powertrain and brakes are similar (albeit tweaked) versions of those used in 2010. Our main improvement is however the chassis, we managed to lower the chassis height without reducing driver space and lowered the center of gravity slightly. This required a smaller pedal cluster, which we managed even despite adding a clutch pedal which makes driving easier for those accustomed to common manual gearboxes.

Also, we learned and applied bionic design for the bodywork and overall aesthetics which produced a clean, smooth and attractive look we’re very pleased about.

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Auburn University has been participating in the Formula SAE Michigan event every year since 1996. For 2012, the team has adopted an aggressive design and manufacturing schedule with specific focus on performance, reliability, and manufacturability. Auburn started from the ground up with this year’s design with an all new monocoque housing a 2006 model Yamaha R6 powerplant. The car features a custom Salisbury limited slip differential, underbody diffuser, wireless telemetry, KAZ/Penske dampers, and suspension kinematics focused on capitalizing on tire performance.

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**Universidad Central de Venezuela**

**Team Formula SAE-UCV**

**Auburn Unv**

**War Eagle Motorsports**

**BRAKE**: 4 outboard discs, dual-piston Wilwood calipers
**BSCO**: 52.5mm bore / 67mm stroke / 3 cylinder / 599 cc
**COOLING**: Sidemounted single radiator with thermostatically controlled on/off fan
**DRIVE**: Chain drive
**ELECTRONICS**: Performance Electronics ECU
**ENGINE**: Yamaha YZF-R6
**FR/RR TRACK**: 1350mm/1250mm
**FRAME**: Tubular Spaceframe
**FUEL SYSTEM**: Indirect fuel injection, sequential
**FUEL TYPE**: 100-Octane
**MATERIAL**: Gasoline
**MPD**: 14500
**MPT**: 8500
**OLWH**: 2675mm long, 1527.81mm wide, 1150.8mm high
**SUSPENSION**: Double Unequal A-Arms, Pull Rods (Front)/Push Rods (Rear)
**TIRE**: 20.5x6-13 R25B Hoosier
**UNIQUE**: Bionic Design for Aesthetics
**WEIGHT**: 553lb
**WHEELBASE**: 1700mm

**BRAKE**: 9.5”/7” F/R floating rotors
**BSCO**: 67mm/42.5mm/4 cyl/599cc
**COOLING**: Dual custom-core radiators
**DRIVE**: Chain-driven Salisbury-style differential
**ELECTRONICS**: MoTec; CAN BUS
**ENGINE**: 2008 Yamaha R6
**FR/RR TRACK**: 1270/1245 mm
**FRAME**: CFRP/5052 Al honeycomb monocoque; 4130 rear spaceframe
**FUEL SYSTEM**: Fuel-injection
**FUEL TYPE**: 93
**MATERIAL**: Fiber-grass
**MPD**: 12000
**MPT**: 10000
**OLWH**: 2763/1588/1087
**SUSPENSION**: F/R SLA
**TIRE**: Michelin 53/13
**UNIQUE**: Active intake runners
**WEIGHT**: 272 kg
**WHEELBASE**: 1651 in
The 2012 Lehigh car utilizes small outer dimensions and an evolution of the composite rail frame to create a vehicle which is as easy to drive as it is to build and service. The composite rail frame can be constructed far more easily than either a steel space frame or a traditional composite monocoque. Carbon flexing A-Arms at all four corners, combined with direct acting dampers up front and a pullrod system at the rear serve to create excellent and predictable handling, while allowing easy service and replacement of components. Commonly available parts make up the majority of the drivetrain, wheel package, and brake system, keeping both costs and manufacturing time to a minimum. A short wheelbase and narrow track width combine to make the car cut effortlessly through the extraordinarily tight courses found at FSAE competitions, while a low CG keeps the vehicle firmly planted on the pavement. The drivetrain, utilizing a 450cc single mated to a spool and removable as a unit, keeps things simple and easy to service. All in all, this is the AK-47 of Formula SAE cars- easy to use, easy to service, and holds its own even when pitted against more technologically advanced machines.

As the team began the design process on the 2012 LSU TigerRacing formula car, the decision was made to keep the design as simple as possible based on the long history of LSU cars not finishing all of the events. The evaluation began by making a list of every part the car would need and assigning an estimated or actual weight if known. The idea was to create a 40/60 fore and aft weight balance to give the car maximum braking performance and with proper tire sizing, good cornering balance. The next step was to estimate the longitudinal and vertical positioning of the center of gravity (CoG) of each part to achieve that balance. A staggered tire combination was needed to regain the cornering balance of the car, resulting in a 9-inch width on the front and a 10-inch width on the rear of the car. Both front and rear tires are a Hoosier R25B compound.
Kookmin Univ’s automotive engineering launched in 1992. Team KOOKMIN RACING was begun with three different team, F-1, Triple-A, I.L.C in 2001. Few years of challenge, we overcame our weaknesses and opened new horizons. We made first “TOP 10” as an Asian team in FSAE series. It is an honor to represent our country. But perhaps even more poignant, it is honor to have the chances to impact the millions of young Asian people in the future.

Our team highly regards the “Acute Response to Driving Maneuver” as the most important factor in designing a racing vehicle. Based on our utmost design concept, we strive to reduce the weight from every possible components. Furthermore, we also make great effort to minimize the clearance on pedal and steering assembly, to increase torsion resistance of frame, and to apply ergonomic design to realize our goal.

Our focus for 2012 is to improve upon our designs from previous years by analyzing the failures and successes of past vehicles. We designed a more reliable and drivable vehicle while adding additional datalogging capabilities to improve our tuning ability and allow our vehicle to serve as a test-system for future years. We also designed the vehicle with the goals of promoting compatibility across systems and enabling amateur drivers to take full advantage of the potential of the car. Throughout the year, the team used computer simulations, subsystem testing, and full-scale data logging to study and improve vehicle performance.

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**BRAKE**: Floating Disc, laser cut steel, Hyundai Master Cyl and Wilwood Calipers
**BSCD**: 80x50mm/4stroke/V-twin/549cc
**COOLING**: Side mounted Aluminum radiator and fan
**DRIVE**: Chain Driven Torsen differential
**ELECTRONICS**: Power commender(Auto tune)
**ENGINE**: Aprilia SXV 550 2008
**FR/RR TRACK**: 1150mm/1100mm
**FRAME**: Tubular space frame
**FUEL SYSTEM**: Injection to Intake for injector, Fuel supply of pump in tank
**FUEL TYPE**: Gasoline 93 Octane
**MATERIAL**: Mild steel 4130
**MPD**: 10000
**MPT**: 7000
**OLWH**: 2145.4mm/635.6mm/1005.4mm
**SUSPENSION**: Double Unequal Length A-Arm
**TIRE**: 18x6.0-10 R25B Hoosier
**UNIQUE**: The efforts of the Korean and The challenge for a dream is KORA
**WEIGHT**: 230kg
**WHEELBASE**: 1550mm

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**BRAKE**: Floating Outboard Rotors
**BSCD**: 67 mm Bore / 42.5 mm Stroke / 4 Cylinder / 599 cc
**COOLING**: Water Cooled, Single Radiator, Double Fan
**DRIVE**: Chain Drive, Torsen T1 Invex Differential with 1.6:1 TBR
**ELECTRONICS**: DTAfast S80 Pro ECU, AiM EVO4 Data logger, Custom PCB for Shifting
**ENGINE**: Honda CBR600RR
**FR/RR TRACK**: 48/47 in F/R (1219/1194 mm)
**FRAME**: Spaceframe
**FUEL SYSTEM**: Sequential Multi-Point Fuel Injection, Single Tank with Surge Dividers
**FUEL TYPE**: 100 Octane
**MATERIAL**: 4130 Steel
**MPD**: 80 hp / 60 kW (9,500 rpm)
**MPT**: 47 ft-lbs / 64 N-m (8,500 rpm)
**OLWH**: Length 101.7 in (2,582 mm), Width 55.4 in (1,408 mm), Height 44 in (1,118 mm)
**SUSPENSION**: SLA with Pushrod-Actuated Coil Springs over 4-way Adjustable Dampers
**TIRE**: 20.5 in / Hoosier R25B
**UNIQUE**: Full-bridge Strain Gauges Measuring Wheel Loads, Chris Bull
**WEIGHT**: 600 lb / 272 kg
**WHEELBASE**: 62 in / 1575 mm
The WU-2012 car was a complete redesign of previous Washington University FSAE submissions. Emphasis was placed on thorough engineering analysis on all components of the vehicle through finite element analysis and computation fluid dynamics. The chassis is a mild steel structural space frame that supports double unequal length A-arms with push rod actuated dampers. Carbon fiber reinforced polymers were utilized in the construction of the intake and the 7-piece body. The car has a custom electro-pneumatic shifting system with a wireless telemetry system to link the data acquisition system and electronics to a remote computer.

We’d like to thank our sponsors for supporting us:
Wash U Student Union, Wash U MEMS Department, Spartan Light Metal Products, The Women’s Society of Washington University, Realize Inc., Accu-Wright Fiberglas, Dura-Bar, Jongbloed Racing, Mittler Brothers, Zoltek, Sigmatex

Outfitted with substantial improvements over the KMR-10, the KMR-11B is the fifth competition car constructed by Knickerbocker Motorsports. Knickerbocker Motorsports designed the KMR-11B to be robust and reliable by improving serviceability, adjustability, and predictability of components like suspension and powertrain. Decreasing mass and increasing power output will also help us achieve our performance goals. Meticulous testing and tuning, along with driver preparation, will produce competitive results at FSAE Michigan 2012 to establish a benchmark for future KM teams.

For the first time in the Dalhousie Formula SAE team’s short history, the design of the 2012 car is an evolution of the previous car rather than an entire re-design. Drivability, reliability, weight, and driver training were chosen as specific areas of improvement for this year’s team.

In the development of the 2012 competition vehicle, a strong emphasis was placed on the car’s powertrain to make the vehicle more driver friendly. This includes a new Tri-Y exhaust manifold with unequal length primaries for a broader torque curve, a rapid prototyped intake, restrictor and barrel style throttle body for improved airflow.

Other key improvements this year include 7075 Aluminum hubs which reduce unsprung rotating mass by 8 lbs and engine mounted eccentric diff mounts which minimize any misalignment when tensioning the chain.

This year’s powertrain focus and key improvements, in combination with the 2011 vehicle’s emphasis on the frame and suspension makes the car Dalhousie’s most competitive vehicle yet.

The team would like to thank all of their sponsors and faculty for making the project possible!

BRAKE : Floating steel rotors, 4-piston calipers
BSCD : 67 mm bore / 42.5 mm stroke / 4 cylinder / 599 cc
COOLING : Single side mounted radiator with ducted electric fan
DRIVE : Rear-wheel drive, 520 Chain, Drexler clutch pack LSD
ELECTRONICS : Motec M400 ECU
ENGINE : Honda CBR 600 RR
FR/RR TRACK : 1200/1155 mm
FRAME : Steel tube space frame
FUEL SYSTEM : Aluminum fuel tank, external pump and filters
FUEL TYPE : 93 Octane
MATERIAL : 4130 steel
MPD : 11000 rpm
MPT : 8000 rpm
OLWH : 2654mm x 1200mm x 1092mm
SUSPENSION : Double unequal length A-Arm. Push rod actuated spring and damper
TIRE : 20.5x7.0-13 R25A Hoosier
UNIQUE : Custom student designed dry sump system
WEIGHT : 650 lb
WHEELBASE : 1545 mm

The CFR2011 has been extensively redesigned over the previous CFR2010 model. It was put on a strict regime and has lost over 50 lbs. It now features all around pull-rod type suspension as well as adjustable static camber and KPI via shims. On the power train side, the intake and exhaust systems have been tuned to provide an ample torque curve for better drivability. Shifting will be possible through an electronically controlled paddle-shift system featuring three shifting modes: manual, semi-auto and automatic.

Many thanks to our sponsors: Mechtronix, Honda Canada, ECA, ENCS, Tuboquip, JB Martin, Verdun Anodizing, Uniboard, SolidCAM, Braille Battery, Bowling & Grippo.

BRAKE : 4-wheel floating discs, Wilwood calipers, Tilton Masters and pedals
BSCD : 67mm / 42.5mm / 4 cyl / 599 cu.cm
COOLING : Pressurized, Thermostatically controlled shrouded cooling fan
DRIVE : #520 Chain
ELECTRONICS : Microsquirt ECU, Race Technolgy DL1 & DASH2
ENGINE : CBR600F4i
FR/RR TRACK : 1342mm / 1237mm
FRAME : Mild Steel Space frame
FUEL SYSTEM : EFI
FUEL TYPE : 93 Octane
MATERIAL :
MPD : 8500
MPT : 7000
OLWH : 2840mm long, 1545mm wide, 1180mm high
SUSPENSION : Unequal length A-Arms. Pullrod-actuated Elka Stage 5 dampers
TIRE : Goodyear D2692 20.0x7.0-13 R075
UNIQUE :
WEIGHT : 300 kg / 660 lb
WHEELBASE : 1675mm
High-Octane Motorsports is the University of Erlangen-Nuremberg's FSAE team. Last year 45 team members developed their fourth race car, the FAUmax delta, with weight reduction as main design goal. This resulted e.g. in a switch to 10" wheels and refinement of our drivetrain layout with a longitudinally mounted V2 engine and a bevel gear final drive. Thus the car weighs only 157kg, 50kg lighter than its predecessor.

Our steel tube frame has an integrated CFRP sandwich undertray, combining high stiffness and low weight. 10" rims consisting of a CFRP well bonded with an Al center reduce unsprung masses. The Aprilia SXV 550 V2 engine generates 56 kW by combining power, torque and low weight. The electronic system, using High-Side Switches for reliability enhancement, offers several driver aids.

Having participated very successfully in three events 2011 (2nd @FSA, winner of the “Best Lightweight Concept Award” and the “Most Innovative Powertrain Award” @FSG, 5th @FSH), we are looking forward to the delta's last competition and the first event for the Octanes in the 2012 season. We thank our sponsors for their support, especially those, who have helped us pay for the shipping to the USA!
The 2012 UNH Precision Racing Team consists of 6 Senior Mechanical Engineers, 1 Junior Electrical Engineer and numerous underclassmen. The 2012 entrant is a mild steel space frame. The suspension utilizes an unequal carbon fiber a-arm design in the front, and steel in the back. The drive train uses a Taylor Racing Limited Slip Differential chain driven. The intake and exhaust for the 2008 Suzuki GSXR 600 engine are tuned to run at 6000 RPM for drive-ability. The electronic system consists of the VEMS ECU and a custom made Formula style dashboard.

The University of Michigan–Dearborn Formula SAE team is in a transition year in which new team members will learn and improve upon proven designs. This year’s design is optimized around the Yamaha Genesis 80FI two cylinder engine and CVT package to produce a vehicle marketed toward the “nonprofessional weekend autocross racer”. The goals of 2012 are to improve reliability, reduce weight, increase power and pay attention to detail while increasing competitiveness. These goals will be reached by continuing to design with simple low mass parts, removing material where appropriate yet increasing strength where necessary, and retaining our simple and high quality manufacturing techniques.
The 2012 car is an evolution over its predecessor. Redesigned from the ground up, the RF12 has been developed to find the optimal balance between performance, reliability and maintainability. Also weighing heavily throughout the design process were aspects of maximizing fuel economy while preserving power, and enhancing driver comfort and safety. Several main design concepts were kept in the forefront to advance the performance of the 2012 car such as reducing the mass and bulk of the chassis by designing an effective suspension system and increasing the specific power output of the engine while reducing fuel consumption and improving drivability. Further develop ergonomics and safety allowed for increased driver comfort and control. In addition reducing rotating mass within the driveline has allowed for variations in final drive ratios, depending on performance preferences.

After a competitive 2011 competition, Wolfpack Motorsports has brought a newly designed steel tube frame chassis along with another evolution of it famous Motec controlled turbocharged E85 engine package to the 2012 competition. The 75 lb-ft of torque from the engine reaches the ground through Quaife internals with a custom housing and TRE halfshafts. After excessive testing of the 2011 car, an optimal suspension geometry has been designed to best use the Hoosier tires chosen by the team. Cane Creek Double Barrel shocks are the center of the suspension system and are actuated by pullrods in the front and pushrods in the rear. The car also is sporting 4 wheel outboard brakes using AP calipers all around. The main goals of the team are to have a reliable turbo 4 cylinder car weighing in under 430 lb and to excel in all dynamic events.
The 2012 Ferris Formula Racing team is proud to present FFR6. The design goals for this vehicle include simplicity, reliability, as well as increased performance. Our performance goal is to finish in the top 25% overall at the FSAE Michigan competition, which is a major improvement over previous years for Ferris Formula Racing.

The design goals will be met by significant changes including: ReKluse Z-Start Pro Clutch, improved suspension geometry with adjustable turnbuckle suspension arms, increased cooling capacity, improved differential housing and mounts, student designed billet aluminum uprights, proportioning valve adjusted brakes, and Garrett GT12 turbocharger with intercooler.

The improvements for this year’s vehicle are due in part to extensive vehicle testing that was performed at the beginning of the season. Strain gauge and durability testing were used on the suspension and drivetrain to necessitate design improvements. An engine dynamometer was used to create a fuel map for proper engine tuning.

The Ferris Formula Racing team would like to graciously thank all of our sponsors and supporters for their help during this 2012 season.

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The 2012 YC Racing team has developed their sixth FSAE racecar around three main objectives: weight reduction, simplicity and reliability. Building on previous years’ experience, new materials were tested and implemented for weight loss in every aspect. Each subsystem was able to research, test, and use materials the team has never used before. We’ve been able to use new design software to increase the reliability and predictability of our designs. Altogether, the 2012 YC Racing team is excited to see how their improvements perform at this year’s competition.
This year’s car, UTR-18 “Barely Legal” was built around simplicity with a focus on vehicle integration and reliability. Utilizing tyre consortium data as a starting point, UTR-18 features a rigid tubular chassis, CBR600 F4i and Penske shocks backed up with extensive durability testing. Serviceability and weight reduction were also greatly considered with every component designed. With a large amount of time dedicated to testing and refining we hope to have an all around reliable and fine tuned car for competition.

EPM12 is an evolution of previous designs. Its focus is reliability and serviceability. The car’s frame was built using VARTM, an improved process control in relation to traditional wet layup, in addition to a higher fiber volume fraction.

EPM12 uses the same Aprilia SXV550 engine as in previous years but with a brand new ECU. With a new fast prototyped intake design, engine was developed to move max torque RPM upwards in order to gain better driveability with a smooth torque curve from 4500 RPM upwards. Adjustable 7800 Penske FSAE shocks were used. The wiring loom was rethought to avoid unreliability. The steering system was also fully redesigned in order to improve its stiffness.

Big Thanks to all our sponsors!
EAGLE, B3CG, AVERA, OMEGA, BOMBARDIER, JB MARTIN, MINICUT, ISAAC INSTRUMENTS, AXIS PROTOTYPES, CTA, SP, GESTION FERIQUE, TRI-TEX, DIACARB, DUPONT, LOCTITE
The goal of the 2012 Polar Bear Racing (PBR) Formula SAE team is to increase performance by reducing vehicle weight. Additionally, an accelerated timeline will ensure ample design preparation and one month of dynamic tuning prior to competition. These strides will give our team the opportunity to achieve PBR's highest results to date.

Featuring PBR’s first single piece carbon fiber chassis and powered by a Honda 600 F4i, this 2012 addition to the PBR family is sure to impress. Focusing on weight reduction and vehicle simplicity will ensure a reliable vehicle for the Polar Bear Racing Team.

Western’s newest car, Viking 53, has many features that differ from the previous cars that the team has worked on. We have developed an all new carbon chassis, pushrod suspension, making adjustments on the track easier and are running 10” wheels in order to try to eliminate weight in the corner packages. Every component of the suspension design was analyzed using Catia's Finite Element Analysis workbench as well as Optimum K and hand calculating all of the loads on these components. This is a level of analysis that has not been done in the last few years and allow the team to have a better expectation of how the components will perform once the car starts it’s testing cycle.

Our electronics team has developed an electronic shifting system writing the code and sourcing the components individually. We are using a Honda F4i 600cc sport bike motor that has been used for several years. The Powertrain team, has worked with several different intakes on this motor and have developed a new exhaust system to make the car more drivable while retaining a high level of horsepower and torque.

**Western Washington Univ Western Washington University**

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BRAKE</strong></td>
<td>Tilton MS</td>
</tr>
<tr>
<td><strong>BSCD</strong></td>
<td>600cc</td>
</tr>
<tr>
<td><strong>COOLING</strong></td>
<td>Water to air heat exchanger</td>
</tr>
<tr>
<td><strong>DRIVE</strong></td>
<td>Drexler Differential, RCV Axles</td>
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<tr>
<td><strong>ELECTRONICS</strong></td>
<td>Steering Wheel mounted, LED warning lamps and 7 segment LCD displays</td>
</tr>
<tr>
<td><strong>ENGINE</strong></td>
<td>Honda F4i</td>
</tr>
<tr>
<td><strong>FR/RR TRACK</strong></td>
<td>47/45.5 in</td>
</tr>
<tr>
<td><strong>FRAME</strong></td>
<td>Full Carbon Composite Monocoque</td>
</tr>
<tr>
<td><strong>FUEL SYSTEM</strong></td>
<td>DTAFast ECU controlled sequential injectors</td>
</tr>
<tr>
<td><strong>FUEL TYPE</strong></td>
<td>91 Octane</td>
</tr>
<tr>
<td><strong>MATERIAL</strong></td>
<td>Not Beryllium</td>
</tr>
<tr>
<td><strong>MPD</strong></td>
<td>10500</td>
</tr>
<tr>
<td><strong>MPT</strong></td>
<td>8500</td>
</tr>
<tr>
<td><strong>OLWH</strong></td>
<td>3020mm (118.9 in) / 1383mm (54.5 in) / 1100mm (43.3 in)</td>
</tr>
<tr>
<td><strong>SUSPENSION</strong></td>
<td>Double unequal length A-Arms. Pull rod actuated horizontal spring and damper</td>
</tr>
<tr>
<td><strong>TIRE</strong></td>
<td>D2704 20.0x7.0-13 R075</td>
</tr>
<tr>
<td><strong>UNIQUE</strong></td>
<td>Single Piece Composite Chassis, Titanium flex link axle option</td>
</tr>
<tr>
<td><strong>WEIGHT</strong></td>
<td>272 kg (600 lbs)</td>
</tr>
<tr>
<td><strong>WHEELBASE</strong></td>
<td>1620mm (63.75 in)</td>
</tr>
</tbody>
</table>

**Brake**

Outboard floating ductile cast iron rotors
22.225 cm front / 18.415 cm rear

**BSCD**

67mm bore / 42.5mm stroke / 4 cylinder / 599 cc

**Cooling**

Single side-mounted aluminum radiator with thermostatically controlled fan

**Drive**

Chain Driven Torsion T1 based differential with 2 piece 7075-T6 housing

**Electronics**

Steering Wheel mounted, LED warning lamps and 7 segment LCD displays

**Engine**

2012 Honda CBR 600F4i, Naturally aspirated

**Fr/RR Track**

1219mm (48 in) / 1118mm (44 in)

**Frame**

Full Carbon Composite Monocoque

**Fuel System**

DTAFast ECU controlled sequential injectors

**Fuel Type**

91 Octane

**Material**

Not Beryllium

**MPD**

10500

**MPT**

8500

**OLWH**

3020mm (118.9 in) / 1383mm (54.5 in) / 1100mm (43.3 in)

**Suspension**

Double unequal length A-Arms. Pull rod actuated horizontal spring and damper

**Tire**

D2704 20.0x7.0-13 R075

**Unique**

Single Piece Composite Chassis, Titanium flex link axle option

**Weight**

272 kg (600 lbs)

**Wheelbase**

1620mm (63.75 in)
The 2012 MIT Motorsports’ vehicle builds on the successes of our previous models. The overall concept of the MY12 vehicle is a 4-cylinder space-frame construction. A target weight of 425 pounds and a center of gravity height of 12 inches were established. The MY12 car was designed from the ground up, without being constrained by past design decisions. Before construction began, a full-car CAD model was detailed to a very high level, and parts were manufactured from proper engineering drawings. This ensured that systems were fully designed and integrated into the car. We strove to better utilize the TTC data, improve systems integration and packaging as well as collecting valuable data for future vehicles. We developed a comprehensive vehicle data acquisition system that measures everything from tire temperature, to brake temperature, to frame stress, to suspension travel, to accelerometer data as well as steering and throttle input. All of this data will be used to validate our original design decisions as well as in aiding design of future models.

Georgia Tech’s 2012 Formula SAE entry features a ground up redesign; focusing on balancing outright performance with reliability. Efficient utilization of resources enabled the Team to go from the start of design to full vehicle testing in just seven months, having the first drive on December 16th 2011. Five months of testing and development before competition have given the Team time to root out design faults, tune vehicle set-up, and correlate vehicle performance simulations.
UOIT Motorsports is pleased to present our 5th vehicle for SAE competition. We have integrated lessons learned throughout our brief enjoyable history thus-far having worked for many hard earned lessons along the way.

Our foremost design goals were simplicity, reliability, lightness, cost efficiency, and a suspension system capable of putting more power to the ground. With last years revolution in design philosophy, a clear improvement towards the mentioned goals, this year is evolution to produce a solid foundation capable of extracting the most from future advancements. Last years drivetrain makes a prominent reappearance with its student made 1 piece aluminum differential and composite half-shafts. Powering things is a KFX450R which has received the addition of a ViPEC standalone system, driveability of a Rekluse clutch makes staging a breeze.

We would like to thank our gracious sponsors:
Durmach – Materials and machining facilities
Our university, UOIT for world class facilities
The City of Oshawa for a place to drive and test.

And who can forget the SAE Event organizers for the wonderful competitions we all enjoy! Please come by our paddock and chat about all things SAE.

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Clemson Formula SAE believes that the most successful design for a Formula SAE competition is a car with Michelin radial tires powered by a normally-aspirated 600cc 4-cylinder engine. The 2012 car is designed to be very drivable and reliable so the drivers are able to extract the maximum amount of performance out of the car from the moment they enter the racing circuit. Our team has been able to build on our successes from last year and learn from our mistakes to produce what should be our most successful car yet.

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**BRAKE**: Wilwood Calipers with Tilton Master Cylinders  
**BSCD**: 62mm/36mm/1 cyl/450cc  
**COOLING**: Side Mounted Water Radiator  
**DRIVE**: 520 Chain; Torsen T1 w/ Monoblock Aluminum cage  
**ELECTRONICS**: ViPEC V44 ECU & MyChron 3 Gold Display  
**ENGINE**: Kawasaki KFX450R  
**FR/RR TRACK**: 46”/44.5” (1170/1130)  
**FRAME**: Steel Tubular Space Frame w/ Aluminum Diff Supports  
**FUEL SYSTEM**: In-House Composite Fuel Tank, In-Line Fuel Pump, In-Line Filter  
**FUEL TYPE**: 100 Octane  
**MATERIAL**: 4130 Frame & A-Arms, 4340 shafts, 6160 Diff Plates, 7075 Hubs.  
**MPD**: 555hp @ 8000rpm  
**MPT**: 45 ft-lbs @ 7800rpm  
**OLWH**: 99” (2515mm), 54” (1375mm), 40” (1 meter)  
**SUSPENSION**: Double unequal length A-Arm, Pullrod Actuated Penske 7800  
**TIRE**: Hoosier 18x6-10 LC0  
**UNIQUE**: Sinusoidal rear axle splines; In-House Composite Fuel Tank  
**WEIGHT**: 500  
**WHEELBASE**: 63” (1600mm)
FSL-12 is a 490 lb spaceframe car mounted on 13” wheels and powered by a turbocharged 600cc engine. However, being able to put all this raw power to good use is the main success of this year’s car. To achieve this, the vehicle was equipped with a semi-auto pneumatic shifter, a Torsen differential, electronic traction control and a three-piece carbon fiber bodywork.

The main goal for the 2012 Red Raider Racing Team was to significantly reduce the weight of the vehicle relative to last season’s car. This is achieved by utilizing a Kawasaki KLX450R single cylinder engine, a lightweight 4130 chromoly space-frame chassis, carbon fiber body pieces and wing package, and aluminum constructed drivetrain and suspension components. All areas of the vehicle were designed around saving weight without an astronomical rise in cost. The chassis design prevents unnecessary material usage and the same goes for the uprights, bellcranks, and pedal box designs. Custom 13” magnesium centered wheels and Goodyear tires transfer the power to the ground and a braking system equipped with Tilton master cylinders, Wilwood calipers, and custom cast-iron rotors bring the vehicle to a halt. The team is incorporating a pneumatic shifting system for faster shifting that does not require a clutch pedal as well as a wing package. The wing package is equipped with a servo-actuated drag reduction system for increased down-force in the turns and reduced drag in the straightaways.

**Texas Tech Univ**

**Red Raider Racing**

- **Engine**: Turbocharged CBR600 RR
- **Frame**: Tubular space frame
- **Cooling**: 1 sidepod mounted radiator with variably controlled electric fan
- **Drive**: 520-series chain
- **Electronics**: Motec M400 and custom relay-box
- **Suspension**: Double A-arm front pull-rod, rear push-rod
- **Fuel System**: Sequential fuel injection; Motec M400 ECU
- **Material**: 4130 steel round and square tubing 0.5” to 1” dia.
- **Tire**: Hoosier 20.0x7.5-13 R25B
- **Weight**: 550lbs
- **Wheelbase**: 1525 mm
NFR12 is Northwestern Formula Racing’s first vehicle completed in a one-year design cycle. Building off of our success with last year’s NFR11, we have aimed to maintain a design that is simple and straightforward, while improving reliability, driver friendliness, and overall design refinement. We use a TIG-welded 4130 steel spaceframe with adjustable double wishbone suspension with anti-roll bars. In keeping with our design goals, we continue to utilize the single-cylinder Suzuki LTR450 engine with a limited slip differential. For the first time, our team is implementing data acquisition systems to gather suspension, engine, and performance data that we can use to improve in future years. As a younger team, this is a critical year for Northwestern Formula Racing, and we are thrilled to be taking part in the 2012 FSAE Michigan Competition. We love talking with the Formula SAE Community, so feel free to stop by our paddock and chat.

For 2012, Penn State Racing has designed a car that represents a major evolution of the featherweight single-cylinder platform that the team introduced in 2009. The evolution of an innovative forced induction system has allowed the team to drastically increase power output while maintaining reliability and low weight. This change is accompanied by an upgrade to a more full-featured ECU with enhanced tuning capability and an advanced electronics package. Packaging of these components is made possible by utilizing the design freedom offered under the alternate frame rules, which also allow for superior lightness and rigidity. The vehicle’s suspension will be utilizing Piggyback Double adjustable dampers and a novel anti-roll solution. Penn State Racing would like to thanks its sponsors for making this car possible.


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**Northwestern Univ**
Northwestern Formula Racing

**Penn State Univ - University Park**
Penn State Racing

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**BRAKE** : Floating style cast iron rotors with custom tophats, Wilwood PS-1 calipers  
**BSCD** : 95.5mm/62.8mm/Single Cylinder/450cc  
**COOLING** : Water cooled  
**DRIVE** : Chain Drive  
**ELECTRONICS** : Motec M400, EV04 data logger with MyChron dash display  
**ENGINE** : Suzuki LT-R450  
**FR/RR TRACK** : 1244 mm / 1219 mm  
**FRAME** : Spaceframe  
**FUEL SYSTEM** :  
**FUEL TYPE** : 93 Octane  
**MATERIAL** : 4130 Steel  
**MPD** : 45 @ 8000 RPM  
**MPT** : 45 @ 6500 RPM  
**OLWH** : 2680 mm, 1417 mm, 1237 mm  
**SUSPENSION** : Double unequal length A-Arm. Push rod-actuated front, Pull rod re  
**TIRE** : 20x7-13 D2704 dry tire  
**UNIQUE** : Stressed engine  
**WEIGHT** : 550 lbs  
**WHEELBASE** : 1575 mm

**BRAKE** : Magnesium Calipers w/ Titanium Pistons and Rotors  
**BSCD** : 96mm Bore / 62.1mm Stroke / 1 Cylinder / 449cc  
**COOLING** : Single Radiator w/ fan  
**DRIVE** : 520 Chain, Drexler LSD  
**ELECTRONICS** : MoTec M400  
**ENGINE** : Honda CRF 450X  
**FR/RR TRACK** : 48” / 48”  
**FRAME** : 4130 Cr-Mo Spaceframe  
**FUEL SYSTEM** :  
**FUEL TYPE** : 100 Octane  
**MATERIAL** : Alloy Steel,Titanium, Magnesium, Carbon Fiber  
**MPD** : 8000  
**MPT** : 75000  
**OLWH** : 94”, 56”, 48”  
**SUSPENSION** : Unequal length, non-parallel A-Arm, push rod actuation  
**TIRE** : 18.0/6.0-10 Hoosier LCO  
**UNIQUE** : Hinson Slipper Clutch  
**WEIGHT** : 445“  
**WHEELBASE** : 61”
Powercat Motorsports 2012 car, Lynx, had three main goals that factored into each design decision made by the team. The first goal was to make the car reliable enough to handle several weeks of racing. Second, the car had to be built on a low budget, thus cost was a major factor. Finally, the car had to be easy to manufacture, to the extent that a majority of the components could be machined on a manual mill or lathe by an inexperienced machinist.

The MRT-14 is the McGill Racing Team’s fourteenth entrant into the Formula SAE series. Equipped with a Rotax ds450 engine, a pushrod actuated suspension setup, and a switch to 10” wheels, the goals of the MRT-14 are as follows: a 15% increase in power through extensive engine tuning and data acquisition, a 7% reduction in weight, increased focus on testing and development of tire knowledge and data.

Simplicity of manufacturing was achieved through standardized plumbing and fasteners as well as maximizing laser cut materials. Three levels of testing has allowed for testing of multiple intake designs in a short amount of time. Development of simulation tools has assisted the McGill Racing Team to make better steering and suspension design choices. Implementation of a redesigned electronics system will allow the team to achieve performance gains better than ever before.

**Powercat Motorsports 2012 car, Lynx**

- **BRAKE**: Wilwood Master Cylinders with PS1 Calipers on all 4 wheels
- **BSCD**: 95mm/63.4mm/1/450cc
- **COOLING**: Side pod Radiator
- **DRIVE**: Torsen Diff.
- **ELECTRONICS**: Electromotive ECU
- **ENGINE**: Yamaha YFZ 450R
- **FR/RR TRACK**: 50/48
- **FRAME**: Chromoly Space Frame
- **FUEL SYSTEM**: Fuel Injection
- **FUEL TYPE**: E-85
- **MATERIAL**: 
- **MPD**: 65 HP at 9000rpm
- **MPT**: 41 ft*lbs at 7000 rpm
- **OLWH**: 117”x56”x48”
- **SUSPENSION**: Double wishbone unequal length push-rod actuated bell cranks
- **TIRE**: 20.5x7R13 Hoosier R25B or Goodyear
- **UNIQUE**: Precise packaging
- **WEIGHT**: 500 lb
- **WHEELBASE**: 68 in

**McGill Racing Team MRT-14**

- **BRAKE**: Four Outboard Floating Discs, AP Racing CP4227/CP4226 Calipers
- **BSCD**: 97 mm / 60.8 mm / 1 Cylinder / 449 cc
- **COOLING**: Liquid-cooled
- **DRIVE**: 520 Chain, Torsen Differential (Custom Casing), Tubular Driveshafts
- **ELECTRONICS**: Performance Electronics EDGE ECU
- **ENGINE**: BRP-ROTAx Type 449, Quad-Valve, DOHC
- **FR/RR TRACK**: 1232 mm / 1181 mm
- **FRAME**: Tubular Steel Space Frame
- **FUEL SYSTEM**: Fuel Injection
- **FUEL TYPE**: 93 Octane
- **MATERIAL**: 1010 Steel
- **MPD**: 
- **MPT**: 
- **OLWH**: 2648 mm / 1423 mm / 1143 mm
- **SUSPENSION**: Pushrod-Actuated, Penske 7800 Dampers, Adjustable ARB
- **TIRE**: 18x6-10 LC0 Hoosier
- **UNIQUE**: Carbon Fiber Flex-Paddle Shifters
- **WEIGHT**: 234 kg (515 lb)
- **WHEELBASE**: 1575 mm
The University of Cincinnati’s Bearcat Motorsports 2012 Car #079 is engineered to be a winning solution for both the amateur and experienced racer alike. Careful balancing between performance, reliability, and cost will leave the autocrosser burning up the track, instead of their hard earned dollar. To increase performance the vehicle’s weight, intertias, and the center of gravity height were minimized; predictable response and drivability were prioritized to improve the driver’s performance. Reliability drove designs to be robust to resist the abuse of driving at the limit. Cost lead to simplified designs, inexpensive materials, and commercially available components, and ergonomic considerations allow for numerous tuning options, for easy maintenance, and for the driver to drive, not fight the car. Attention was taken to design the car as an integrated system with increased safety.

Cornell Racing’s entry for the 2012 Formula SAE competition is the ARG12 prototype. Born out of a reevaluation the team’s design philosophy, ARG12 features dramatic improvements over and refinements of the ARG11 prototype. In an attempt to maintain its power advantage while improving its drivability and performance, Cornell Racing has opted for a new engine package in conjunction with a completely redesigned suspension system. At the heart of the new engine package is a turbocharged Honda CBR600RR controlled by a MoTeC M400 ECM in conjunction with a dry sump lubrication system and active boost control. Furthermore, the newly designed suspension system will be centered on 10-inch wheels, allowing for reduced overall and unsprung mass. Tying these systems together will be a hybrid monocoque and tubular steel frame, allowing for rapid engine replacement from the removable steel frame and increased stiffness from the composite monocoque. Using other advancements such as a Drexler 2-way adjustable differential, blade-type adjustable anti-roll, and a rapid-prototyped intake manifold, Cornell Racing aims to regain its Championship title at Formula SAE Michigan 2012.
St. Cloud State University's 2012 entry, #81, is powered by a carbureted 449cc single-cylinder engine and transmission from a 2007 Honda TRx450ER. The output sprocket powers a final drive consisting of a heavily modified carrier assembly from the differential of a 2005 Honda Rubicon. This tightly packaged rear end uses lengthened CV shafts to deliver power to the wheel ends, while a rear inboard braking system stops them. The power will be controlled using electronic pushbutton shifting.

The car was designed with a modest wheelbase and track width held by a double wishbone-type front suspension with pushrod actuation, and a dual H-beam short-long-arm rear suspension, also with pushrod actuation. The tubular space frame is constructed from steel DOM tubing, mainly consisting of a high strength low alloy material. The entire package rides on 10” wheels and machined aluminum hubs and uprights.

Simplicity, functionality, and reliability are the three main concepts that governed the vehicles design in order to maximize drivability and performance. We’d also like to thank all sponsors and supporters of this year’s car, because it wouldn’t be possible without you.

**BRAKE**: Wilwood dual piston, outboard (Front) / inboard (Rear)  
**BSCD**: 96mm bore / 62.1mm stroke / 1 cylinder / 449cc  
**COOLING**: Single mounted radiator  
**DRIVE**: Chain driven limited slip differential  
**ELECTRONICS**:  
**ENGINE**: Honda TRx450ER  
**FR/RR TRACK**: 1219mm (48 in) / 1219mm (48 in)  
**FRAME**: HSLA tubular steel space frame  
**FUEL SYSTEM**: Carburated with Inline Pump  
**FUEL TYPE**: 93 Octane  
**MATERIAL**: 1020 DOM tubing and HSLA steel tubing  
**MPD**:  
**MPT**:  
**OLWH**: 2781mm / 1384mm / 1257 mm  
**SUSPENSION**: SLA double wishbone, pushrod actuated spring and damper  
**TIRE**: 19.5 x 6.5-10 R25B Hoosier  
**UNIQUE**: Rear inboard braking system, electronic push button shifting  
**WEIGHT**: 575 lbs (260 kg)  
**WHEELBASE**: 1651 mm / 65 in

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Podium 600s was entirely set up only for F-sae. We spent most of our days on the machine. The primary goal of the design is weight lightening. We adapted carbon fiber for the surge tank. And we also added minor changes for the front frame structure. The new shaped exhaust manifold is only purposed for higher pressure. Double Deck Diffuser is aptly described as one of the characters that makes it more distinctive. The first thing we had to deal with was making improvements on the machine comparing to last year’s machine.

**BRAKE**: S&T Motors MS3 calipers, 420J2 Stainless steel disc  
**BSCD**: 58mm bore / 57mm stroke / 4cylinders / 599cc  
**COOLING**: Side pod mounted dual radiators  
**DRIVE**: 520ERV3 Chain Drive Type, M&Tech1.5 way LSD  
**ELECTRONICS**: LED tachometer, Electronics Shifter  
**ENGINE**: 04 CBR600RR  
**FR/RR TRACK**: 1400mm / 1340mm  
**FRAME**: Truss construction frame  
**FUEL SYSTEM**: Injector type  
**FUEL TYPE**: 93  
**MATERIAL**: Seamless Mild steel round tubing pipe  
**MPD**: 13000  
**MPT**: 12000  
**OLWH**: 2555mm, 1400mm, 1030mm  
**SUSPENSION**: Front-Pull rod, Rear-Push rod  
**TIRE**: 175/515R13 6J Kumoh  
**UNIQUE**: Gear type stabilizer bar  
**WEIGHT**: 507lb / 657lb with driver  
**WHEELBASE**: 1550mm(61.02inch)
The 2012 WPI FSAE car is primarily based off of its 2011 predecessor with major improvements in the chassis, front suspension, braking components, Intake, exhaust, fuel tank, tuning of the CVT, and uprights for the front suspension. The focus for this year’s improvement was manufacturability, serviceability, weight reduction, and lowering the car’s center of gravity. The car utilizes Yamaha Genesis 80FI two cylinder engine and CVT that drive a solid rear axle. All of the car’s components were designed and analyzed in SolidWorks. The systems redesigned this year experienced at least a ten percent weight reduction. The car also features a more comfortable drive position and a smaller radiator.

Design of UMaine’s first FSAE car is based on the principles of simplicity and reliability. A 4130 chromoly spaceframe carries all components of the car, while being strong and reliable. Careful design created a stable vehicle that is still capable of maneuvering through the smallest sections of a course. Pushrods actuate an inboard suspension system. The suspension has been designed to allow for easy assembly and adjustability without introducing excess variability into the system. Spring and damping rates are tuned to optimize performance gains. A chain driven torsen type limited slip differential allows peak cornering capabilities while transferring the maximum amount of power under all conditions. The differential is the rearmost component of the car, allowing for easy maintenance and assembly. A jacking point has been incorporated into the differential mount. The car includes a composite racing seat and composite bodywork which forces air around the engine, improving cooling capabilities. Power is provided by an Aprilia RXV550 V-twin. System data is logged using a Race Technology DL1 unit and Dash2 display, providing the driver with real time feedback.

**UNIVERSITY OF MAINE**

**ENGINEERS**

**Engine**

- **Yamaha Genesis 80FI**

**Frame**

- **Tubular 4130 space frame**

**Suspension**

- **Direct acting SLA front, zero roll swing axle rear**

**Brake**

- **Wilwood Calipers & Cylinders**

**Cooling**

- **Single Radiator**

**Drive**

- **5 speed, Chain Drive, Torsen Diff**

**Electronics**

- **Race Technology DL1 Datalogger w/Dash2 Display**

**Fuel System**

- **Low Pressure**

**Material**

- **4130**

**Width**

- **1575mm/62in**

**Tire**

- **Hoosier 20 x 6.5 - 13 R25A**

**Unique**

- **Composite Bucket Seat**

**Weight**

- **550lb**

**Wheelbase**

- **1549mm**
The 2012 University of Windsor Lancer Motorsports team focused on optimizing many key features of the 2011 car. The targeted goals for this year were to reduce the overall vehicle weight from previous cars, to emphasize driver ergonomics and comfort and to allow for more driver development and vehicle tuning. The CNC profiled 4130 tubular space frame chassis weight was reduced by 7kg through the use of Nomex composite sandwich shear panels and using various tube sizes. Chassis design validation was conducted using ANSYS to simulate torsional and bending load scenarios that occur doing braking and cornering.

The power is developed from a 4 cylinder Honda CBR600RR engine has been tuned for a flatter torque curve and responsiveness, developing 45 lb-ft of torque at 7000 RPM and peaking at 95 horsepower at 11000 RPM at the rear wheels. The power is transferred by a chain driven modified Honda Rubicon differential with billet 7075 CNC machined tripods. From there the power meets the track via 20x7x13 Goodyear D2696 tires mounted on magnesium BBS rims.

The 2012 team is looking to have a successful year with this lighter more powerful vehicle and to build on the success for future years.

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The 2012 Mississippi State University Formula SAE vehicle is an improvement upon the 2010 vehicle last seen at MIS. Goals for improvement were simplification of subsystems, increased power output, increased manufacturability, addition of aerodynamic devices, and improvement of driver comfort. Keeping these goals in mind, the team believes that a vehicle produced under these guidelines would result in a low cost production vehicle with handling capabilities to be competitive on the SCCA scene.

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**Univ of Windsor**
Lancer Motorsports

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**Mississippi State Univ**
Mississippi State University Formula SAE
The 2012 Duke FSAE car is a major redesign from previous years. One major focal point for this year is aerodynamics, using aerodynamic downforce to generate more grip. Having done preliminary testing during the 2011 season, we have decided to equip our 2012 car with a full aerodynamics package. The suspension has been redesigned around the aero package, the wheelbase has been reduced, and the frame has been designed to be smaller, lighter, and stiffer. In addition, individual subsystems have also been redesigned with aero in mind. We have also been able to reduce the weight of the rest of the car through optimizing part design, integrating more composite materials, and more advanced manufacturing techniques.

Osprey Racing was founded in January, 2010. The university did not have the resources to support the program. None of the founding members had any experience with automotive design and manufacturing. We are now finishing work on the school’s first Formula SAE entry. It has been an extremely challenging and rewarding path.

On our own, we raised the necessary capital. We established industry contacts to assist with design and manufacturing. We pushed the limits of the school’s fabrication lab. With no experience or previous car, we built everything from scratch. Our goal was well defined: Design and manufacture a Formula SAE vehicle that conforms with the 2012 rules and successfully completes every dynamic event. A set of tenants was drafted to guide our design process:
1. F = ma (Does it make the car go faster?)
2. Keep It Simple Stupid (Is it required by the rules?)
3. To finish first, you must first finish
4. Safety > Reliability > Performance > Cost
5. Parts left off weigh nothing, cost nothing, and don’t cause service problems
6. The consequence of engineering is compromise. To judge our design is to know our story. This is it.

**Duke Univ**

**Duke Motorsports**

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**Osprey Racing**

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**BRAKE:** Outboard floating front rotors, inboard fixed rear rotors
**BSCD:** 67mm bore / 42.5mm stroke / 4 cylinder / 599 cc
**COOLING:** Single side pod mounted radiator with PWM controlled electric fan
**DRIVE:** Torsen T-1 LSD
**ELECTRONICS:** PE3 ECU
**ENGINE:** Honda CBR600 F4i
**FR/RR TRACK:** 48.6in F/48.1in R
**FRAME:** Tubular Space Frame
**FUEL SYSTEM:** 195 cc/min RC Eng injectors, sequential
**FUEL TYPE:** 100 Octane
**MATERIAL:**
**MPD:** 9500
**MPT:** 7200
**OLWH:** 2486 mm long, 1425 mm wide, 1130 mm high
**SUSPENSION:** Double Unequal Length A-arm, Pushrod Actuated Spring with Penske 7800 damper
**TIRE:** Goodyear D2704
**UNIQUE:**
**WEIGHT:** 620 lb
**WHEELBASE:** 61 in

**BRAKE:** Four wheel outboard, High carbon stainless steel, hub mounted
**BSCD:** 67mm/42.5mm 599cc inline four cylinder
**COOLING:** Single, side mounted radiator
**DRIVE:** 520 chain drive with Torsen T1 Differential
**ELECTRONICS**
**ENGINE:** Honda CRB600RR
**FR/RR TRACK:** 56 in
**FRAME:** 4130 steel space frame
**FUEL SYSTEM:** Internal fuel pump pressure regulator, sequential fuel injection
**FUEL TYPE:** 93 Octane
**MATERIAL:**
**MPD:**
**MPT:**
**OLWH:** 98.7 in, 60 in, 37.4 in
**SUSPENSION:** Double unequal length A-Arms, pull rod actuated front, push rod rear
**TIRE:** Hoosier 20.0 x 7.5-13 R25B
**UNIQUE:** Dry sump
**WEIGHT:**
**WHEELBASE:** 64 in
Wazzu Racing designed this year’s car with the main goals being reliability and weight. Our drivetrain is based around a naturally aspirated single cylinder YFZ450 engine with a rapid prototyped intake. Power is delivered to the wheels through a clutch pack style limited slip differential and custom axles. The suspension system focuses heavily on weight reduction with a majority of components being fabricated from 7050 aluminum. Lightweight Brembo P32 calipers along with in house machined aluminum hats and stainless steel rotors provide the necessary braking force. Overall wet weight of the car is 380 lbs without driver.

BRAKE : Brembo P32 Calipers w/ custom rotors  
BSCD : 98mm x 62 mm, Single Cylinder 468CC  
COOLING : Radiator in sidepod  
DRIVE : Chain drive w/ honda clutch pack LSD  
ELECTRONICS : Microsquirt ECU  
ENGINE : Yamaha YFZ450  
FR/RR TRACK :  
FRAME : Chromoly 4130 Spaceframe  
FUEL SYSTEM : Custom EFI  
FUEL TYPE : 100 Octane  
MATERIAL :  
MPD :  
MPT :  
OLWH :  
SUSPENSION : Pushrod with Fox Vanilla RC on all 4 corners  
TIRE : Goodyear 2704 13x20  
UNIQUE : Composite floor, custom molded seat, rapid prototyped intake  
WEIGHT : 525 lbs  
WHEELBASE : 60 Inches

This year design is different in most of the departments. Suspension got new shocks and uprights. The differential is completely different, the engine tuning reached a new level with the custom ecu and intake cam. The custom made radiator will keep overheat away, the new pedals assembly design is lightweight, cheap and stong enough and the frame material changed to optimize the weight which was the principal objective in each aspect of the design. A lot of new features and an increased reliability will certainly bring us success.

BRAKE : 3 wilwood dynalite caliper, w/ 2 master cylinders  
BSCD : 599cc  
COOLING : water/air radiator cooled engine  
DRIVE : rwd w/ limited slip differential  
ELECTRONICS : custom ecu and wiring  
ENGINE : honda vfr600r  
FR/RR TRACK : 48/46  
FRAME : space frame 4130  
FUEL SYSTEM : efi w/ fuel pressure regulator  
FUEL TYPE : 93  
MATERIAL : chrommoly  
MPD : 12000 rpm  
MPT : 9500 rpm  
OLWH : 2540/100, 1352/53, 1181/46  
SUSPENSION : penske double adjusts shocks  
TIRE : 13in hoosier r25b  
UNIQUE : custom ecu  
WEIGHT : 600lbs  
WHEELBASE : 1524/60
Rich with history and tradition, the RIT Formula SAE Racing Team has competed in thirty-eight Formula SAE and Formula Student competitions on three different continents. In twenty years, RIT has been awarded numerous accolades, including overall titles in the US, England, and Australia. In the 2011 competition season RIT placed 5th at Formula Student Germany with strong performances in individual events including a victory in acceleration, 3rd place in Autocross, and 4th place in Skidpad.

The goal of the RIT Formula SAE Racing Team is to produce a winning car for the FSAE competitions. To achieve that, the racecar must be fast, reliable, easy to drive, and efficient. An extensive simulation effort guided the design process. Physical testing was performed using both destructive and non-destructive methods. Dynamometers were used to properly tune the engine, dampers, and brakes. An efficient testing plan was designed in order to best utilize the spring season to validate critical design aspects of the vehicle.

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**Rochester Institute of Technology**

**RIT Formula SAE Racing Team**

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The 2012 model features several innovative components, some of which include a side mounted motor for yaw moment optimization and extremely light-weight suspension achieved by thin section bearings. The spool and belt drive system are designed for quiet and simple operation coupled with a flux capacitor for superior performance and reliability. Indy style seat inserts are custom fitted to each driver for enhanced ergonomics and driver performance.

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**UCMC Racing**

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Information published as supplied by teams on or before March 26, 2012
The car was built almost entirely in house by team members. The intake design has been changed to a breadbox design to reduce the length of the intake runners and to attempt to increase the overall flow rate through the restrictor. The suspension system is an unequal A-Arm design which consists of upper A-Arms of a shorter length than the lower A-Arms that has been optimized to ensure that the wheels maintain a slight negative camber. The engine is a 2002 Suzuki GSX-R 600 with Wiseco 13.3:1 high compression pistons, the engine is of light weight construction and incorporates a clutch with 4 speed transmission. The engine is mounted longitudinally in the rear of the car, and transfers power to the rear end by a simple drive shaft. The chassis has been recently improved upon allowing the removal of the engine without the need to split the car. Body panels of the car are fabricated using fiberglass and AOC Resins “EcoTek” resins. It is a special “green” resin. The simplified design of the car has allowed for a low cost car with simple manufacturing techniques. This design has been emphasized for the competition to provide the end user a reliable, inexpensive competitive vehicle.

Villanova University’s 2012 entry into the Formula SAE Competition (hereafter referred to as VU04) represents the team’s fourth year in the competition, as well as the first time we are using a new engine (Yamaha YZF-6R), differential (Drexler 2010), redesigned drive train, and new wheels. While last year’s car, VU03, was a huge step forward for the team (our first suspension, chassis, intake, and exhaust redesign) VU04 is truly designed from the ground up, carrying over only the dampers and ECU. Some highlights include a frame that is 11% lighter and 32% stiffer, a new engine complete with a dry-sump system, a completely new drivetrain, a new paddle-actuated compressed gas shift/clutch system, and tuned intake and exhaust manifolds.
Our approach towards designing each system was methodical and iterative while keeping the processes as uniform as possible. One of our goals for the suspension design was to allow the car to provide useful feedback to the driver. Selecting an unequal length double A-arm layout for the front and rear suspensions assisted in achieving that goal. In the development of our braking system, it was desired to have a similar piston travel in the front and rear master cylinders. Therefore, a balance in the line pressure and master cylinder bore between the front and rear brake systems was made utilizing Wilwood PS1 calipers in the front and a single caliper in the rear. By choosing the Honda F4i engine, we were able to tune the primary and secondary lengths of the exhaust tube header in order to broaden the torque curve. In our drivetrain design, a Quaife differential was mounted by a student designed and fabricated mounting system. To see how the chassis would react to different loading scenarios, time was spent in utilizing Solidworks FEA.

The overall design goal for NIU12 is a minimalist, simple, lightweight and reliable car, keeping in mind the intended customer of the weekend auto crosser. Calspan Tire Data centralized the design phase, allowing optimization of suspension geometry, chassis components, and powertrain systems. Adjustability was also given a high priority. The NIU12 total vehicle weighs in at 390 pounds, while utilizing a 550cc two cylinder engine and 13 inch wheels. Frame weight has been minimized to 65 pounds total, utilizing a space frame. Drivetrain progress yielded a custom aluminum differential and tripod housings, using an anodizing system for wear resistance. Custom brake hats and rotors are designed to maximize braking performance. Steering utilizes a student designed steering shaft operated by a custom steering wheel. Engine progress yielded a simple, reliable system with proven competitive power numbers. Dual side pods are utilized to protect electronics and maximize airflow to a single radiator. In addition, internal spring dampers are fine-tuned via on track testing.
The 2012 car was designed to build on the successes of 2011 and redress any failures. This year the engine is from a Honda CBR600RR motorcycle. The stock transmission has been replaced with a student-designed output housing and shaft, mating the engine to a CVT. This allows the engine to operate at a speed which produces maximum power and eliminates the need for shifting gears. A rapid prototyped converging-diverging nozzle restrictor leads into the aluminum intake manifold while exhaust gases exit through a 4-into-1 collector and Yoshimura muffler.

The independent front and rear suspensions have SLA geometry with pushrods actuating FOX VAN RC shocks. Stopping power is provided by Wilwood Dynalite and Dynapro calipers clamping Wilwood racing pads and student-designed 10 inch cast iron rotors. 6061-T651 Aluminum uprights and centerlock spindles reduce the unsprung weight of the car while providing strength and rigidity.

The space frame is made from 4130 chromoly steel 1 inch and 5/8 inch OD tubing with 1020 CD steel tabs. Kevlar body panels and side pods are used to reduce weight.

Crimson Racing’s design objectives for the 2012 FSAE entry are to design and construct a reliable, competitive, and enjoyable race car. A secondary objective is to allow for ease of manufacture and to create good value in the overall target cost for producing the vehicle in quantity.

In the eighth year of design and competition, we have practiced year after year for continuous improvement of our race car design relative to the competition. We seek the most rigid frame design, a perfect suspension, and the most efficient engine and drive train. Thorough studies have repeatedly indicated that perfect subsystems mean nothing if they cannot be integrated properly with the rest of the car. For 2012, our goal was to take the methods that worked in the past and to optimize them.

**BRAKE**: Outboard Spindle Mounted Rotors, Wilwood Calipers and Master Cylinders  
**BSCD**: 67mm bore / 42.5mm stroke / 4 cylinder / 599 cc  
**COOLING**: Single side mounted custom tank aluminum radiator with pod  
**DRIVE**: CVT with 520 roller chain  
**ELECTRONICS**: Power Commander V with LCD for datalogging  
**ENGINE**: Honda CBR600RR  
**FR/RR TRACK**: 55 inches / 52 inches  
**FRAME**: 4130 chromoly Space Frame  
**FUEL SYSTEM**: External Fuel Pump and Regulator; EFI  
**FUEL TYPE**: 93 octane  
**MATERIAL**: 4130 chromoly steel tubes with 1020 CD tabs  
**MPD**: 11500  
**MPT**: 10500  
**OLWH**: 95 inches / 62 inches / 43.5 inches  
**SUSPENSION**: Double Unequal Length A-arms, Pushrod Actuated  
**TIRE**: 20.5x7-13 R25B Hoosier  
**UNIQUE**: CVT with Customized Output Housing and Shaft; Kevlar Body Panels  
**WEIGHT**: 650 lbs  
**WHEELBASE**: 62 inches
The 2012 MTSU car is a product not only of the basic technical rules set forth, but also of the often overlooked objective that this must be able to be readily replicated in a cost effective manufacturing environment. The decision was made that our car would be designed for the end user to buy a set of instructions and pre-engineered portions of car from the ‘manufacturing’ company, buy a donor ATV, and assemble the car themselves as a partial kit. Individual components were chosen or designed not for flash, but for their performance, robustness and ability to perform an entire season of hard racing without failure.

Several components were engineered in-house which marry new designs with commonly available subcomponents. For example, the sprag-type differential was built specifically for an FSAE type car, but allows the attachment of a variety of different Yamaha ATV ring gears to bolt directly to it.

A race car is only a tool, and like any other, if the tool is not right for the job, it will prove inadequate and worthless. This common-sense approach to our car, backed with proper engineering, appropriate safety factors and attention to performance make ours an excellent design.

The Queen’s 2012 entry builds on the extensive background and knowledge of the team to bring an entirely brand-new vehicle design to competition. The design seeks to improve reliability and simplicity of the vehicle, focusing on the vehicle at a fundamental level before concentrating on ancillary components. The result is a vehicle that is not only lighter, but more powerful and drivable than recent Queen’s vehicles.
Oxford Brookes Racing (OBR) presents ISIS xII for the 2012 Michigan Formula SAE competition. ISIS xII is OBR’s twelfth entry and has been designed and built by the most international team competing in Michigan. The core team consists of 20 students representing 12 different nations.

Through the entire design process of ISIS xII, an in-house developed, transient vehicle model has been utilised for suspension and chassis design evaluations. Design decisions have been based upon performance sensitivity studies and held up against sensible cost and manufacture-time targets. ISIS xII is designed to achieve a high level of performance, while also being constructed in-house almost entirely by students.

OBR has focused on designing a car that complies with the spirit of the FSAE regulations, while also being suitable for the hobby racer. Not only must the car be comfortable for every driver, but also reliable and easy to maintain and adjust. ISIS xII has been designed to allow for efficient manufacture with simple production techniques, while still maintaining a high level of innovation and good engineering practice.

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This is Florida Atlantic University’s fifth produced racecar. We focused on weight reduction and improving kinematic performance using highly optimized structures, such as our lightweight sheet metal uprights. The GSX-R600 was selected as the power plant for this chassis utilizing an aluminum sheet metal intake tuned to increase mid to high end power to decrease lap times. The power was transferred to the rear wheels using lightweight off the shelf Drexler LSD differential.

Many thanks go to the following sponsors: Florida Atlantic University College of Engineering, Auto Glitz, Auto Salon, Broward Motorsports, Burns Stainless, Dolfab, FGCI, ILS Technology, Moe’s Southwest Grill, Motorola Rapid Prototyping Services, MRP Motorsports at PBIR, Race Part Solutions, Ricardo, Solid Works, Velocity Factor, and The Corvette Store.

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**BRAKE**: AP Master Cylinders with adjustable bias bar. ISR Radial Mount Caliper

**BSCD**: 95mm bore / 72mm stroke / 1 cylinder / 510 c

**COOLING**: Side pod mounted radiator with thermostat controlled electric fan

**DRIVE**: 520 steel chain from engine to diff mounted sprocket

**ELECTRONICS**: Motec ECU

**ENGINE**: KTM 530 EXC single

**FR/RR TRACK**: 1125 front / 1095 rear

**FRAME**: Aluminium Sandwich Panel Front Monocoque / Tubular Spaceframe at the rear

**FUEL SYSTEM**: Student des/built ,fuel injection, sequential

**FUEL TYPE**: 100 octane

**MATERIAL**: 4130 Steel Round Tubing .5” to 1” Diameter

**MPD**: 8500

**MPT**: 6500

**OLWH**: 2611mm long, 1325 mm wide, 1096mm high

**SUSPENSION**: Double unequal length A-Arm. Push rod actuated spring / damper.

**TIRE**: 20x6.2-13 Avon FTO 9241

**UNIQUE**: Aluminium monocoque, CFRP fuel tank, interchangable ratio steering rack

**WEIGHT**: 850kg

**WHEELBASE**: 1600

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**BRAKE**: Four Wheel Brembo Disc Brakes

**BSCD**: 67.0mm/ 42.58mm/ 4cyl/ 600cc

**COOLING**: Single Radiator w/Thermostatic Controlled Electric Fan

**DRIVE**: 11/46 Final-Chain Drive w/Drexler LSD

**ELECTRONICS**: AEM Universal EMS, Custom Dash

**ENGINE**: Suzuki GSX-R600

**FR/RR TRACK**: 1270mm/1219mm

**FRAME**: Front and Rear Tubular Space Frame

**FUEL SYSTEM**: Aluminium Tank w/Electric fuel Pump Driving Multi-Port Injection

**FUEL TYPE**: 93 Octane

**MATERIAL**: 4130 Steel Round Tubing .5” to 1” Diameter

**MPD**: 10,500 RPM

**MPT**: 7,000 RPM

**OLWH**: 2665mm Long, 1454mm Wide, 1095mm High

**SUSPENSION**: Double Unequal Length A-Arm. Pullrod Actuated Horizontally Oriented Springs

**TIRE**: Goodyear D2696 20x7-13 [inch]

**UNIQUE**: Electronic Driver Adjustable Control

**WEIGHT**: 285kg

**WHEELBASE**: 1530mm
Western Formula Racing's 2012 vehicle was designed with a focus on improving vehicle speed and reliability, through increased testing time and optimization of 2011 vehicle system designs.

The 2012 engine design is based on engineering fundamentals to ensure overall reliability. A new laser sintered intake manifold aims to improve the quality and manufacturing tolerances over previous designs. The drive-train system features a new Drexler FS LSD chain drive differential to improve reliability and tunability. The chassis is a steel space frame; its design is honed for simple load paths, triangulation of all nodes, and design for assembly. The suspension system kinematics were chosen to effectively utilize the properties of our tires, which were defined by tire data analysis. The vehicle body consists of a carbon fibre nose cone and sidepods, with aircraft fibre closeouts. A testing plan has been developed to ensure all components perform reliably during competition. The 2012 Western Formula Racing team is excited and we're expecting a great performance at this year's competition.

The 2012 Ace's Racing vehicle has been designed to meet all of the University of Evansville Team's goals. The team has maintained a final drive weight of less than 400 lbs for the second year with the use of a single cylinder power plant. The power plant has been tested and validated through chassis dynamometer testing, ensuring the engine's optimization. For the first time, the team has validated all finite element analysis, guaranteeing accuracy throughout all design calculations. Finally, Ace's Racing will be implementing an optimized body design that will greatly reduce drag. With the 2012 design, the team hopes to see significant improvements in vehicle performance and placement in the upcoming competition.

**Western Formula Racing**

**UWO Formula Racing**

- **BRAKE**: ISR Calipers, Floating steel rotors
- **BSCD**: 67.0mm bore / 42.5mm stroke / 4 cylinders / 599cc displacement
- **COOLING**: Single side mounted heat exchanger with electric van
- **DRIVE**: Chain, 428 pitch
- **ELECTRONICS**:
  - **ENGINE**: Honda CBR600 F4i
  - **FR/RR TRACK**: 1150mm/1100mm
  - **FRAME**: Steel space frame
  - **FUEL SYSTEM**: Student designed/built, fuel injection
  - **FUEL TYPE**: Gasoline 92 Octane
  - **MATERIAL**: Steel frame, Carbon fibre body
  - **MPD**: 12000
  - **MPT**: 8000
  - **OLWH**: 2650mm, 1360mm, 1000mm
  - **SUSPENSION**: Double unequal length control arms. Push/Pull rod actuation.
  - **TIRE**: Hoosier R25B 20 x 7.5
  - **UNIQUE**: Aluminum honeycomb sandwich panel
  - **WEIGHT**: 125 kg
  - **WHEELBASE**: 1536mm

**Univ of Evansville**

**Aces Racing**

- **BRAKE**: Custom machined floating brake rotors
- **BSCD**: 97mm bore, 60.8mm stroke, single cylinder, 449cc
- **COOLING**: Differential mounted AL radiator with manually controlled single speed fan
- **DRIVE**: chain driven, stock Rotax gear box
- **ELECTRONICS**:
  - **ENGINE**: Rotax DS 450 EFI
  - **FR/RR TRACK**: 1220mm, 1250mm
  - **FRAME**: Tubular space frame
  - **FUEL SYSTEM**: Honda fuel injection system
  - **FUEL TYPE**: 91 Octane
  - **MATERIAL**: 4130 steel round tubing, .5” to 1” dia
  - **MPD**: 8000
  - **MPT**: 8500
  - **OLWH**: 2718mm long, 1250mm wide, 1169mm high
  - **SUSPENSION**: Double unequal length A-Arm, Pull rod actuated spring/damper, Adj. roll bar
  - **TIRE**: 20x6.0-13 R25A Hoosier
  - **UNIQUE**:
  - **WEIGHT**: 238kg
  - **WHEELBASE**: 1550mm
"The EMS12R is a an almost completely new racecar compared to the EMS11R and EMS10R. An all new frame, suspension design, engine control system, and instrument cluster allows for evolutionary leaps Eagle Motorsports has never seen in the past. The EMS12R is 12 pounds lighter than the EMS11R due to innovative use of a freshly engineered spool main drive, single-disk inboard rear brake, significantly smaller frame, and lighter suspension components. Ergonomics has vastly improved eventhough the EMS12R's cockpit is 33% smaller than the EMS11R's. Our simple and clean design philosophy applies and should deliver solid on-track performance."

Panther Racing's contender for the 2012 competition is a revolutionary design compared to recent years. It features a brand new suspension layout with push rods at all four corners and new uprights with integrated camber adjustment. The chassis has undergone minor changes with the exception of the rear bay, which has been completely removed to reduce unnecessary weight. More revolutionary design points include the ergonomics and electronic systems. The integration of launch and traction control, along with electronically controlled pneumatic paddle shifting, LED gear indicator, and data logging have greatly increased our ability to tune the car for maximum performance and driver preference. Revised ergonomics include: a custom formula style steering wheel with molded hand grips, a more reclined seating position with better fitting seats and a fully adjustable pedal box. A more efficient plenum design along with the improved manufacturing techniques used to fabricate the headers have ensured that our engine will achieve much better airflow than in previous years. These revolutionary designs will project Panther Racing into a more successful future in the FSAE competition series.

**Georgia Southern Univ**

**Eagle Motor Sports**

BRAKE : Front: Hydraulic Disk / Rear: Hydraulic Disk  
BSCD : Bore: 98mm / Stroke: 72mm/ Single-Cylinder / 543cc  
COOLING : Liquid Cooled w/ Thermostatically Controlled Electric Fan  
DRIVE : Chain Drive  
ELECTRONICS : PE3 ECU, Arduino Powered Cluster  
ENGINE : KTM 525 [543cc] CR:13.5:1  
FR/RR TRACK : 1116mm (44in) / 1048mm (41.25in)  
FRAME : Tubular-Steel Space Frame  
FUEL SYSTEM : Fuel Injection  
FUEL TYPE : 100 Octane  
MATERIAL : Frame: AISI 1026 Steel  
MPD : 50 BHP @ 9500 rpm  
MPT : 34 ft*lb @ 7400 rpm  
OLWH : L: 2442mm (96.14in) / W: 1290mm (50.8in) / H: 1220mm (48in)  
SUSPENSION : Double A-Arm / Pullrod & Rocker  
TIRE : Hoosier R25B 18.0x6.0-10  
UNIQUE : Crank Trigger/Generator, Arduino-based instrument cluster.  
WEIGHT : 590 lb  
WHEELBASE : 1597mm (62.875in)

**Univ of Pittsburgh - Pittsburgh**

**Panther Racing**

BRAKE : Brembo Front/AP Racing Rear  
BSCD : 67.0 mm (2.6 in) x 42.5 mm (1.7 in), inline 4 cylinder 599cc  
COOLING : Custom triple pass Spike Radiator  
DRIVE : Chain Driven/Clutch LSD  
ELECTRONICS : Performance Electronics Beta ECU  
ENGINE : Honda CBR600RR  
FR/RR TRACK : 48”/46”  
FRAME : 4130 Chromoly Steel Space Fram  
FUEL SYSTEM : Fuel Injected  
FUEL TYPE : 93 Octane  
MATERIAL : Fiberglass bodywork  
MPD : 9000 - 9500 rp  
MPT : 8000 rpm  
OLWH : L: 105” x 55” x 40”  
SUSPENSION : Double Unequal length A-Arm  
TIRE : Goodyear D2704  
UNIQUE : Electronically controlled pneumatic paddle shifting  
WEIGHT : 590 lbs  
WHEELBASE : 633
Metropolia Motorsport (former Stadia Motorsport) is celebrating its decade of racing in Formula SAE with a comeback to the roots of the competition: North America. Almost everything is student designed and fabricated — including even team clothing — and we take a lot of pride in the high quality of finish and detail of the car.

Our newest creation HPFO11/20 combines very high performance to very high reliability. It's built around a tubular steel space frame with composite stress panels and forces are transmitted to the tarmac through double a-arms and 13” tires kept on the ground by pushrod actuated suspension.

The heart of the car is a highly modified R6 engine delivering a maximum power of 75kW. A wide spread of torque combined with a wet weight of 195kg's ensures high performance in all driving situations. Sophisticated electronics provide a friendly user interface with steering wheel paddles, flat-out shifting and launch control. Traction aids are also available when the weather is down.

The whole beauty is wrapped inside aramid fiber bodywork sketched by industrial design students. The distinctive appearance is finished with a special livery to suit the occasion.

In 2006 the first building blocks for the foundation of the Rennstall Esslingen were placed at the University of Applied Sciences Esslingen. Now it is one of the largest projects at the university. The Stallardo '11 is the first car from Esslingen to compete in the USA, after being very successful in Germany, Austria and Italy in 2011. The knowledge and experience of the previous years are reflected in this year’s car. The team’s goal was to build a lightweight, reliable, powerful and fast car. We kept the basic concept of a 4 cylinder engine and a tubular space frame from last year’s car; however each component has been revised and optimized. The engine tuning includes a new camshaft, new pistons and many other modifications. A custom designed gearbox, steering rack and cooling system are a few major design highlights. For more information visit our Homepage: http://www.rennstall-esslingen.de.

**Metropolia Motorsport**

| BRAKE | Floating, hub mounted, laser cut steel |
| BSCD | 67mm/42.5mm/599.4cc |
| COOLING | Single aluminum radiator on right side, PWM controlled fan and water pump |
| DRIVE | 428 Single row chain drive |
| ELECTRONICS | Motec ECU, ADL and PDM |
| ENGINE | 2010 Yamaha R6 |
| FR/RR TRACK | 1200mm/1150mm |
| FRAME | Tubular steel space frame with composite stress panels |
| FUEL SYSTEM | Student designed and manufactured with staged sequential injection |
| FUEL TYPE | 98 octane RON unleaded gasoline |
| MATERIAL | Ruukki Form 600, 22mm to 30mm dia. 200g twill carbon & aluminium honeycomb |
| MPD | 10700 |
| MPT | 8300 |
| OLWH | 2895mm/1380mm/1160mm |
| SUSPENSION | Double unequal length A-Arm. Push rod actuated horizontally mounted dampers |
| TIRE | 20.5 x 7 R13 R25B |
| UNIQUE | Plenty of |
| WEIGHT | 579lb |
| WHEELBASE | 1550mm |

**Rennstall Esslingen**

| BRAKE | ISR 4 piston front, 2 piston rear, floating discs |
| BSCD | 67.5 mm bore / 42 mm stroke / 4 cylinder / 608.3 cc |
| COOLING | Water cooled, custom radiator |
| DRIVE | 520 chain, Drexler LSD |
| ELECTRONICS | Bosch MS4 |
| ENGINE | 2010 Yamaha R6 |
| FR/RR TRACK | 1240 / 1180 mm |
| FRAME | Steel spaceframe |
| FUEL SYSTEM | Fuel Injection |
| FUEL TYPE | 100 |
| MATERIAL | |
| MPD | 10500 rpm |
| MPT | 8500 rpm |
| OLWH | 2571 mm long, 1440 mm wide, 968 mm high |
| SUSPENSION | Double wishbone, pullrod front/pushrod rear |
| TIRE | Hoosier R25B 20.5x7-13 / 20x7.5-13 |
| UNIQUE | Electro-mechanical shifter |
| WEIGHT | 265 kg |
| WHEELBASE | 1580 mm |
VTM12 is the 25th vehicle produced by Virginia Tech Motorsports for competition in Formula SAE sanctioned events. The team established quantifiable goals and a formal testing program to validate the predictive models used for system level designs. A light weight, fuel efficient vehicle platform, incorporating a tube frame chassis and single-cylinder engine was chosen. For the benefit of an amateur driver, augmentation systems are included. An undertray and diffuser were designed in order to increase the tractive limits of the 10” wheels with Hoosier LC0 tires. Powering the car is a single-cylinder, Yamaha WR450F. The displacement was increased to 502cc’s by increasing both cylinder bore and piston stroke, improving horsepower and torque outputs from the engine over the desired operating range of 6,000-9,000 RPM. The drivetrain gearing was designed with this power-band in consideration. An adjustable limited-slip differential allows the torque bias ratio to be tuned for acceleration and deceleration scenarios. Testing of suspension, powertrain, and electrical systems were analyzed and redesigned in order to ensure any driver is capable of driving the car at its tractive limits.

Engine-We will be using an Aprilia SXV 450cc V-twin motorcycle engine. The engine has been completely rebuilt with a low friction coating applied to the piston skirts.

Suspension-Adjustable shocks for the suspension were ordered at appropriate spring rates (125 lb/in in the front and 97 lb/in in the rear). The push/pull rods and anti roll-bars for the front and rear suspension will be replaced with more lightweight carbon fiber as apposed to aluminum.

The Steering System-The steering system uses a manual rack and pinion unit bespoke to the car using carbon fiber float tube and a carbon fiber rack with a mild carbon steel gear set grafted to it. The steering rack itself is designed to be able to quickly and easily swap pinion gears for and adjustable rack ration and thus overall steering ratio. The final change to the steering system is carbon fiber steering linkages with 6061 aluminum rod end inserts to help keep the un-sprung mass down.

Drivetrain-We will be using a Torsen differential custom made aluminum housing. We will also have filament wound carbon fiber half shafts with aluminum inserts. Our final drive ratio will be 3.06, and be chain driven.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Engine</td>
<td>Yamaha WR450F</td>
</tr>
<tr>
<td>Displacement</td>
<td>502cc</td>
</tr>
<tr>
<td>Drivetrain</td>
<td>Torsion Bias</td>
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<tr>
<td>Brakes</td>
<td>Custom Rotors/ Wilwood PS-1/AP Racing 4226/</td>
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<td>Tilton m/v</td>
</tr>
<tr>
<td>BSCD</td>
<td>97mm/68mm/Single/502cc</td>
</tr>
<tr>
<td>Cooling</td>
<td>Sidepod-mounted radiator with thermostat-</td>
</tr>
<tr>
<td></td>
<td>controlled electric fan</td>
</tr>
<tr>
<td>Drive</td>
<td>Chain drive, stock gearbox</td>
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<tr>
<td>Electronics</td>
<td>Custom with MoTeC M400 ECU</td>
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<tr>
<td>Frame</td>
<td>AISI 4130N Chrome-Moly Tubular Steel Spaceframe</td>
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<tr>
<td>Fuel System</td>
<td>Bosch Saturated 310cc Injector, Honda CRF450</td>
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<td>Internal Fuel Pump</td>
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<td>Fuel Type</td>
<td>93 Octane</td>
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<td>MPD</td>
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<td>OLWH</td>
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<td>Suspension</td>
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<td>Barrel Dampers</td>
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<td>Tire</td>
<td>Hoosier 18x6.0-10 LCO</td>
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<td>Unique</td>
<td>Eccentric Chain Tensioning</td>
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<td>Weight</td>
<td>475 lbs</td>
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<tr>
<td>Wheelbase</td>
<td>1536mm</td>
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</table>
GMI2012 runs deep.

The design began with the selection a Basset 13” x 6” steel wheel and Hoosier 20.5x7.0-13 R25 tire. The frame and chassis was designed around the suspension nodes to provide a functional yet lightweight platform. To control the fueling and ignition a Megasquirt 3 with expansion card was chosen. The controller will control fuel and spark using the factory triggering sensors with modifications only to the cam angle wheel. To lower the center of gravity of the vehicle, the engine has been installed as low as possible. Because the factory oil pan does not allow ideal placement of the engine, a new oil pan has been CNC machined in-house from an aluminum billet. To transmit power from the engine to the wheels a Torsen differential will be used. The differential itself was purchased directly from Torsen, but the integration of the differential into the vehicle is entirely student designed.

**Kettering Univ**

**Kettering Formula SAE**

**BRAKE**: Custom designed steel rotors, Brembo Calipers  
**BSCD**: 95mm/62.4mm/1 Cyl/ 450 cc  
**COOLING**: Modified WR450 radiators  
**DRIVE**: Chain driven cam and paw differential  
**ELECTRONICS**: Mototron/ProEFI 48 pin ECU  
**ENGINE**: Yamaha WR450f  
**FR/RR TRACK**: Front: 1240mm/48.8in  
Rear: 1196mm/46.8in  
**FRAME**: Welded Unobtanium Spaceframe  
**FUEL SYSTEM**: Proprietary  
**FUEL TYPE**: 85% C2-H5-OH 15% Other  
**MATERIAL**: Proprietary  
**MPD**: 204 Furlong*N/s @ 9500 RPM  
**MPT**: 124.5 N*ft @ 7000 RPM  
**OLWH**: 2453/96.6 Long, 1423/56.0 Wide, 1124/44.25 Tall  
**SUSPENSION**: Double unequal length titanium A-arms. Pull rod actuated shocks  
**TIRE**: 20.2x7.0-R13 Goodyear D2704  
**UNIQUE**: Embraces Flint automotive culture by utilizing oversized rims.  
**WEIGHT**: 234 kg  
**WHEELBASE**: 1549mm/61in

**Central Connecticut State Univ**

**Blue Devils Motorsports**

**BRAKE**: Wilwood 2 piston front single piston rear  
**BSCD**: 67.0 mm (2.6 in) x 42.5 mm (1.7 in) / 599cc  
**COOLING**: Honda Factory  
**DRIVE**: Chain  
**ELECTRONICS**: Megasquirt  
**ENGINE**: 2008 CBR600RR  
**FR/RR TRACK**: 48 inches / 47 inches  
**FRAME**: 4130 chromoly space frame  
**FUEL SYSTEM**: Megasquirt  
**FUEL TYPE**: 93 octane  
**MATERIAL**:  
**MPD**: 10,000  
**MPT**: 7,000  
**OLWH**: 102”x54”x 39.75”  
**SUSPENSION**: Ohlins Double Piston  
**TIRE**: 21x8 R25B  
**UNIQUE**:  
**WEIGHT**: 700 lbs  
**WHEELBASE**: 60.5 inches
This car marks the fourth car produced by UCONN Formula SAE since the reforming of the team in 2007. The team focused on building upon last year’s solid basic design to improve overall performance. The team plans to finish in the top 50 (40%) at Michigan and to finish endurance. A reduction in overall cost was also chosen as a goal to better meet budget requirements. The team has gained much knowledge over the last 4 years and this car represents the effort to apply knowledge gained in previous years to all aspects of this event.

**William R. “Bill” Adam Formula SAE® Vehicle Development Grant**

Honoring Bill Adam, his extraordinary contribution to FSAE, and his lifelong dedication to mentoring young engineers

Established in 2004, this annual grant is administered by SAE, with applications being reviewed by the family of Bill Adam. The selected team will receive a $500 grant to be applied toward the development of their vehicle.

To learn more about this award and other exciting opportunities, please visit [http://students.sae.org](http://students.sae.org).

---

**Specifications:**

- **BRAKE**: 4 disk, fully floating
- **BSCD**: 4 Cylinder, 599cc
- **COOLING**: Single sidepod mounted radiator, swirl pot, electric fan
- **DRIVE**: Chain Drive
- **ELECTRONICS**: PE-Edge
- **ENGINE**: GSx-R600
- **FR/RR TRACK**: 48in/1219.2mm, 46in/1168.4mm
- **FRAME**: Steel Space Frame
- **FUEL SYSTEM**: Fuel Injected, Returnless
- **FUEL TYPE**: 93 Octane
- **MATERIAL**: 4130 Chromoly
- **MPD**: 85hp 8500rpm
- **MPPT**: 55ft-lb 5000rpm
- **OLWH**: 104in/2641.6mm, 57.5in/1460.5mm, 47.5in/1206.5mm
- **SUSPENSION**: Double A-Arm with Anti-roll Bars
- **TIRE**: Hoosier r25b
- **UNIQUE**: Extensive use of cast Magnesium and Aluminum
- **WEIGHT**: 640lb
- **WHEELBASE**: 61in/1549.4mm

**William R. Adams Ad**

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  - **Title:**
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Key Players
(as of April 1, 2012)

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

SAE INTERNATIONAL STAFF
EDUCATION RELATIONS:
- Bob Sechler – Manager, Education Relations
- Steve Daum – Manager, Collegiate Design Series Programs
- Sam Barill – Manager, Collegiate Design Series Programs
- Kaley Zundel – Event Relations Operations Manager
- Allison Charney – Collegiate Program Coordinator
- Martha Schanno – Event Development, Corporate Sales

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- John Burford, Matthew James, John Lankes, Gerry LaRue, Thomas Martin, Jean Paul Montant, Matthew Petty, Bill Riley, Dale Sormaz, Robert Tarlton, Thomas Tarlton, Brian Zander

EVENT CAPTAINS
- Acceleration – Bob Goppold and Steve Balanecki
- Announcer – Richard Jeryan
- Autocross – Joe Paolicchi and Matt Kalmus
- Brake, Practice & Switch Test – Alba Colon and Mark Scott
- Cost – Suzy Zukowski
- Design – Tony Lyscio, Bill Riley and Steve Fox
- Dynamic Events SCCA Safety Stewards – John Lisiecki and Ed Arthur
- Dynamic Gate Manager – Dave McCagg
- Electrical Vehicle Tech Inspection - Tobias Michaels
- Endurance – Laura Wontrop and Matt Kalmus
- Fuel – Alba Colon, Mike Thodoroff, and Herb Seubert
- Noise Test – Greg McConville and Gary Newton
- Paddock Patrol – Mike Thodoroff and Dudley Smith
- Presentation – Adam Zemke and David Roberts II
- Scales – Mike Thodoroff and Steve Balanecki
- SCCA Liaisons- Mike McClintock and Steve Baumbach
- Skid Pad – Steve Taylor and Laura Wontrop
- Stewards – Mike Thodoroff and Peter Kuechler
- Technical Inspection – Kevin Royle, Mark Muddiman and Jeff Lovell
- Tilt Table – Alba Colon, Mark Scott and Vince Bandurski
- Volunteer Registration & Information – Sue Coppa

COST JUDGES

PRESENTATION JUDGES

DESIGN JUDGES (invited in 2012)
SPORTS CAR CLUB of AMERICA (SCCA) VOLUNTEERS

VOLUNTEERS

STEWARDS
- Mark Costin, Ben Cruz, Mark Kiesow, Adam Kottlarek, Peter Kuechler, Augusto Lee, Jose Lugo, David Meirose, Jason Moore, Len Prezecki, Angel Samalot-Quiles, Jonathan Swoveland, Joe Vitous, Alton Worthington

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