Friends,

Michigan State Formula Racing welcomes you into a brand-new year of competition! Our team proudly represents Michigan State University in Formula SAE—the world's largest collegiate design series with over 550 teams competing worldwide. FSAE challenges students to design, manufacture, develop, and compete a small, open-wheel race car every year.

With a history of over thirty years, Michigan State Formula Racing has been providing undergraduate students with an unparalleled opportunity to apply knowledge acquired in the classroom, as well as learn a plethora of skills that are only instilled through hands-on experience. Consequently, those who graduate from the team enter the global workforce with a matchless understanding of the design, manufacturing, and management that is required to take an idea from concept to reality.

Every year, a new and improved vehicle rolls out of the workshop as a product of devoted, passionate, and driven team members. However, without your help, the MSU Formula Racing Team would not be where it is today. With the 2020-2021 season well underway, we thank you for your continued generosity, and we hope that you’ll support us on our journey this year to a first-place finish.

Go green, go white, go fast!

Dave Yonkers
Project Manager
Engineering

Every season, MSU Formula Racing Team members collectively spend over 10,000 hours designing and optimizing the upcoming year's vehicle platform.

Students use engineering principles from many disciplines...

- Dynamics & Kinematics
- Thermodynamics
- Fluid Mechanics
- Structural Mechanics
- Mechanical Vibrations
- Control Systems
- Material Science
- Embedded Software
- Electronics & Circuits
- Artificial Intelligence & Machine Learning
Manufacturing

Over 85% of the MSU Formula Racing Team’s vehicle is manufactured in-house by students every year.

Students learn conventional fabrication methods, such as:

- Hand & CNC milling
- Hand & NC lathing
- TIG welding
- Stamping & bump-forming
- Soldering, crimping, & wire looming
- PCB etching
- 3D printing
- Composite molding
### The Result: SR-20

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track Width</td>
<td>50 in</td>
</tr>
<tr>
<td>Wheelbase</td>
<td>60.5 in</td>
</tr>
<tr>
<td>Weight</td>
<td>425 lbs</td>
</tr>
<tr>
<td>Tire</td>
<td>Hoosier 16x6-10 R25B</td>
</tr>
<tr>
<td>Engine</td>
<td>2007 Honda CBR600RR</td>
</tr>
<tr>
<td>Oil System</td>
<td>Two-stage dry sump</td>
</tr>
<tr>
<td>Fuel</td>
<td>93 Octane gasoline</td>
</tr>
<tr>
<td>Cooling</td>
<td>Dual side-mounted radiators</td>
</tr>
<tr>
<td>Shifting</td>
<td>Electro-pneumatic</td>
</tr>
<tr>
<td>Drivetrain</td>
<td>Drexler limited slip differential</td>
</tr>
<tr>
<td>Electronics</td>
<td>MoTeC M400, Bosch C50</td>
</tr>
<tr>
<td>Custom Modules</td>
<td>PDM, ATCC, Telemetry</td>
</tr>
<tr>
<td>Driver Display</td>
<td>Custom</td>
</tr>
<tr>
<td>Frame</td>
<td>Carbon fiber monocoque</td>
</tr>
<tr>
<td>Suspension</td>
<td>Double A-arm</td>
</tr>
<tr>
<td>Brakes</td>
<td>Twin-piston Brembo</td>
</tr>
<tr>
<td>Power</td>
<td>85 hp</td>
</tr>
<tr>
<td>Torque</td>
<td>45 lb-ft</td>
</tr>
<tr>
<td>Downforce</td>
<td>290lbf @ 45 mph</td>
</tr>
<tr>
<td>L/D Ratio</td>
<td>3.30</td>
</tr>
<tr>
<td>0-60 mph</td>
<td>3.2 s</td>
</tr>
<tr>
<td>Lateral Acceleration</td>
<td>3.3 g</td>
</tr>
<tr>
<td>Braking Acceleration</td>
<td>2.8 g</td>
</tr>
</tbody>
</table>
# Recent Competitions

<table>
<thead>
<tr>
<th>2019 FSAE Michigan</th>
<th>2019 FSAE Lincoln</th>
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</thead>
<tbody>
<tr>
<td><strong>T8</strong> Design</td>
<td><strong>T15</strong> Design</td>
</tr>
<tr>
<td><strong>21</strong> Presentation</td>
<td><strong>8</strong> Presentation</td>
</tr>
<tr>
<td><strong>8</strong> Acceleration</td>
<td><strong>2</strong> Acceleration</td>
</tr>
<tr>
<td><strong>15</strong> Autocross</td>
<td><strong>15</strong> Skidpad</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2019 Pittsburgh Shootout</th>
<th>2019 Toronto Shootout</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3</strong> Overall</td>
<td><strong>3</strong> Overall</td>
</tr>
<tr>
<td></td>
<td><strong>2</strong> Driver</td>
</tr>
</tbody>
</table>
The Team
Dr. Gary Cloud
Faculty Advisor

Nicholas Kopec
Chief Engineer
Electrical Team Lead

Dave Yonkers
Project Manager
Software, Simulation

James Provax
Aerodynamics Lead

Garrett Colasinski
Chassis Lead

Robert Walston
Powertrain Lead

Nick Coubard
Suspension Lead

Miko Parkinson
Aero Structures

John Burroughs
Dynamic Aero Simulations

Calum Walton
Rear Subframe

Anissa Sant
Ergonomics

Andrew McNamara
Composite Structures

Sammy Cohen
Harness

Ronald Hodge
Electrical R&D

Olivia Reyes
Intake & Exhaust

Mitchell Clark
Driveline & Shifting

Justin Yan
Dyno & Calibration

Noah Goldman
Cooling

Bhanu Makkapati
Oiling

Bashhar Byrouthy
Powertrain R&D

Matthew Ajlouny
Brakes
Public Appearances
- North American International Auto Show
- Woodward Dream Cruise
- MSU Engineering Colloquium
- Sparticipation
- Formula SAE competitions
- MSU Homecoming Parade
- MSU Engineering Preview Day
- MSU Engineering Design Day

Publications
- The Spartan Racer
- State News
- The Lansing State Journal
- MSU Today
- The Detroit News
- Popular Science
- RACETECH
- SAE Momentum Magazine

Social Media
- @msuformularacing
- @michiganstateu
Community

MSU Formula Racing recognizes the importance of community contribution. Without a helping hand, none of what the team accomplishes would be possible, which is why volunteering at local schools, providing workshop tours, and supporting community outreach remains an important part of the team’s mission. From inspiring the next generation of engineers and businesspeople, to lending a helping hand to those who need it: MSU Formula Racing continues to engineer a legacy.
## 2020-2021 Budget

### Chassis
<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Carbon Fiber</td>
<td>$18,000</td>
</tr>
<tr>
<td>Machining &amp; Tooling</td>
<td>$24,500</td>
</tr>
<tr>
<td>Honeycomb</td>
<td>$7,500</td>
</tr>
<tr>
<td>Adhesives</td>
<td>$2,500</td>
</tr>
<tr>
<td>Consumables</td>
<td>$2,250</td>
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<tr>
<td>Raw Materials</td>
<td>$2,250</td>
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<tr>
<td>Film Adhesive</td>
<td>$3,500</td>
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<tr>
<td>Seat Belts</td>
<td>$500</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>$61,050</strong></td>
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</table>

### Aerodynamics
<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Fiber</td>
<td>$18,000</td>
</tr>
<tr>
<td>Machining &amp; Tooling</td>
<td>$24,500</td>
</tr>
<tr>
<td>Nomex Core</td>
<td>$500</td>
</tr>
<tr>
<td>Ribs &amp; Spars</td>
<td>$1,500</td>
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<tr>
<td>Structural Foam</td>
<td>$700</td>
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<tr>
<td>Consumables</td>
<td>$500</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>$25,200</strong></td>
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</table>

### Brakes
<table>
<thead>
<tr>
<th>Item</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Pedal Box</td>
<td>$1,000</td>
</tr>
<tr>
<td>Master Cylinders</td>
<td>$1,500</td>
</tr>
<tr>
<td>Fittings &amp; Brake Line</td>
<td>$500</td>
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<tr>
<td>Calipers</td>
<td>$1,200</td>
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<tr>
<td>Rotors &amp; Pads</td>
<td>$900</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>$5,100</strong></td>
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</tbody>
</table>

### Powertrain
<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine</td>
<td>$1,500</td>
</tr>
<tr>
<td>Drivetrain</td>
<td>$6,000</td>
</tr>
<tr>
<td>Cooling System</td>
<td>$1,500</td>
</tr>
<tr>
<td>Oil System</td>
<td>$1,500</td>
</tr>
<tr>
<td>Fuel System</td>
<td>$500</td>
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<tr>
<td>Intake</td>
<td>$1,500</td>
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<tr>
<td>Exhaust</td>
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<tr>
<td>Shifting</td>
<td>$850</td>
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<tr>
<td>Raw Materials</td>
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<tr>
<td>Consumables</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>$19,700</strong></td>
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### Electrical
<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Data Aq. &amp; ECU</td>
<td>$14,000</td>
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<tr>
<td>Modules</td>
<td>$4,700</td>
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<tr>
<td>Sensors</td>
<td>$2,000</td>
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<tr>
<td>Wire Harness</td>
<td>$2,000</td>
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<tr>
<td>Consumables</td>
<td>$450</td>
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<tr>
<td>Battery</td>
<td>$950</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>$24,100</strong></td>
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</table>

### Testing
<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tires</td>
<td>$4,250</td>
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<tr>
<td>Fuel</td>
<td>$1,000</td>
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<tr>
<td>Oil</td>
<td>$500</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>$5,750</strong></td>
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</tbody>
</table>

### Shop Supplies
<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tools</td>
<td>$1,000</td>
</tr>
<tr>
<td>Hardware</td>
<td>$1,000</td>
</tr>
<tr>
<td>PPE</td>
<td>$750</td>
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<tr>
<td>Computers</td>
<td>$4,650</td>
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<tr>
<td>Software</td>
<td>$1,000</td>
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<tr>
<td>Office Supplies</td>
<td>$250</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>$8,650</strong></td>
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### Competition Expenses
<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver Gear</td>
<td>$2,200</td>
</tr>
<tr>
<td>Tires</td>
<td>$5,400</td>
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<tr>
<td>Fuel</td>
<td>$4,000</td>
</tr>
<tr>
<td>Food</td>
<td>$1,200</td>
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<tr>
<td>Lodging</td>
<td>$7,000</td>
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<tr>
<td>FSAE Michigan</td>
<td>$2,500</td>
</tr>
<tr>
<td>FSAE North</td>
<td>$2,500</td>
</tr>
<tr>
<td>FSAE California</td>
<td>$2,500</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>$27,300</strong></td>
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### Contingency Cost
<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td><strong>Contingency Cost</strong></td>
<td><strong>$10,800</strong></td>
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**Total Cost**: $208,750
## Sponsorship Levels

<table>
<thead>
<tr>
<th>Feature</th>
<th>Pit Crew ≤ $499</th>
<th>Titanium $500 - $999</th>
<th>Bronze $1,000 - $2,499</th>
<th>Silver $2,500 - $4,999</th>
<th>Gold $5,000 - $9,999</th>
<th>Platinum ≥ $10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax recognition</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
</tr>
<tr>
<td>Promotion of name on msuformularacing.com</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
</tr>
<tr>
<td>Invitation to the team's annual vehicle unveil ceremony</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
</tr>
<tr>
<td>Logo featured in the team's monthly newsletter – The Spartan Racer</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
</tr>
<tr>
<td>Logo in a prominent place on the race car, with size proportional to sponsorship level</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
</tr>
<tr>
<td>Team workshop available for corporate tours</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
</tr>
<tr>
<td>Availability to place corporate banner on display in the team workshop</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
</tr>
<tr>
<td>Access to the team résumé book</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
</tr>
<tr>
<td>Access to team member recruitment presentations</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
</tr>
<tr>
<td>Access to the team race car for company events</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
</tr>
<tr>
<td>Promotion during public appearances</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
</tr>
<tr>
<td>The ability to customize team appearances and sponsorship promotion to maximize exposure</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
</tr>
</tbody>
</table>
SPARTANS WILL.
Thank you for your support!

GO GREEN. GO WHITE. GO FAST!