2019 COMPETITION
APRIL 28 - MAY 2

FORMULA HYBRID

2018 WINNER

ABET INNOVATION AWARD

THAYER SCHOOL OF ENGINEERING AT DARTMOUTH
Welcome to the 13th Annual Formula Hybrid International Competition!

We are delighted to be hosting 20 teams this year, with 19 of those teams returning to Formula Hybrid after competing in previous years. This year we have eight teams competing their hybrid vehicles, and twelve teams entering their electric vehicles. Every year we look forward to the exhilaration, ingenuity, and camaraderie our teams exude that help make Formula Hybrid one of the most unique competitions in the world.

We hope you take a moment between inspection anxiety, competition adrenaline, and the unpredictable weather turbulence to take a step back, a deep breath in, and just appreciate your presence during this collaborative occasion.

Formula Hybrid greatly appreciates the dedication of hundreds of individuals, from our sponsors and volunteers to our innovative and tenacious teams, all of whom represent the invigorating future of engineering.

Mike Chapman, Director  
Jessica Kinzie, Coordinating Manager  
mike@formula-hybrid.org  
doug@formula-hybrid.org  
jessica@formula-hybrid.org

Formula Hybrid Competition Organizers

Thayer School of Engineering at Dartmouth • 14 Engineering Drive • Hanover, NH 03755 • 603.646.6580 • formula-hybrid.org

---

**Schedule**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>Group Photo</td>
</tr>
<tr>
<td>8:30</td>
<td>Awards Ceremony</td>
</tr>
<tr>
<td>9:00</td>
<td>Reception For Advisers, Officials, and VIPs</td>
</tr>
<tr>
<td>10:00</td>
<td>Mandatory Elect. Safety Class Electrical Tech. Building</td>
</tr>
<tr>
<td>11:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>12:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>1:00</td>
<td>Mandatory Elect. Safety Class Electrical Tech. Building</td>
</tr>
<tr>
<td>2:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>3:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>4:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>5:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>6:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>7:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>8:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>9:00</td>
<td>Lunch Break</td>
</tr>
</tbody>
</table>

**Note:** Garages closed from 12:00 midnight until 8:00 AM the following morning.

**Schedule subject to change—watch for postings.**
“It’s a good chance to see students in action working on hybrid vehicles, to get to pick out strong leaders and talent for the future.”
— Jeffrey Brandon, Senior Project Engineer, Fiat Chrysler Automobiles; FH Sponsor and Mentor

“The competition was, as always, a venue for collaboration and engineering excellence.”
— Taha Ramazanoglu, Yale Bulldogs Co-Captain; FH Alum

“We look for engineers that will embrace our industry’s rapid evolution. The tech-savvy and multi-disciplined engineers from Formula Hybrid take this challenge in stride.”
— Ronn E. Jamieson, Director, Under Hood Design and Release, General Motors; FH Sponsor and Mentor

“We look for engineers that will embrace our industry’s rapid evolution. The tech-savvy and multi-disciplined engineers from Formula Hybrid take this challenge in stride.”
— Ronn E. Jamieson, Director, Under Hood Design and Release, General Motors; FH Sponsor and Mentor

“The depth of knowledge and creativity shown by these students is amazing and inspiring. Each year I anxiously await seeing the new approaches shown and technologies used.”
— Harold Flescher, Nuclear Physicist, IEEE Life Fellow; FH Special Judge

“It’s given us a great opportunity to connect with students before we get to the competition and, for us, to get to have a better understanding of the challenges that the students face as they move through the design process.”
— Scott Lasanna, Test Engineer, General Motors; FH Alum and Judge

“You build a car, but more than that you build a team, you build a family.”
— Sven Wehrman, University of Waterloo; FH Alum

“The best evidence of the success and uniqueness of Formula Hybrid are the alumni who are contributing to robotic and mechatronics competition where all participants are winners.”
— Tremont Miao, Retired Product Managing Director, Analog Devices; FH Alum

“The learning that we took away from the event is priceless and only makes us want to do better next year.”
— Kartik Narayan, Team Astra Racing, NMIT, Bangalore, India; FH Alum

“The Formula Hybrid rules act as a design standard requiring students to have exquisite attention to detail and documentation, at a level that is foreign to most students, but typical of what would be required in industry. Automotive industry recruiters come to competition with an eye to hiring students who excel at the innovative thinking and action that Formula Hybrid demands.”
— Raina White, Advisor, Dartmouth Formula Racing

“We look for engineers that will embrace our industry’s rapid evolution. The tech-savvy and multi-disciplined engineers from Formula Hybrid take this challenge in stride.”
— Taha Ramazanoglu, Yale Bulldogs Co-Captain; FH Alum

“Formula Hybrid is an educational experience that provides the tools to develop lifelong skills and high-performing individuals that will grow to excel both technically and operationally at Formula Hybrid and well after.”
— Nathalie Capati, General Motors Engineer; FSAE alumna, FH Alum

Rallying for Formula Hybrid
Numerous Formula Hybrid participants contributed supporting comments to the ABET Innovation Award nomination. Here's a sampling.

―The depth of knowledge and creativity shown by these students is amazing and inspiring. Each year I anxiously await seeing the new approaches shown and technologies used.”
— Harold Flescher, Nuclear Physicist, IEEE Life Fellow; FH Special Judge

―It’s given us a great opportunity to connect with students before we get to the competition and, for us, to get to have a better understanding of the challenges that the students face as they move through the design process.”
— Scott Lasanna, Test Engineer, General Motors; FH Alum and Judge

―You build a car, but more than that you build a team, you build a family.”
— Sven Wehrman, University of Waterloo; FH Alum

―The best evidence of the success and uniqueness of Formula Hybrid are the alumni who are contributing to robotic and mechatronics competition where all participants are winners.”
— Tremont Miao, Retired Product Managing Director, Analog Devices; FH Alum

―The learning that we took away from the event is priceless and only makes us want to do better next year.”
— Kartik Narayan, Team Astra Racing, NMIT, Bangalore, India; FH Alum

―The Formula Hybrid rules act as a design standard requiring students to have exquisite attention to detail and documentation, at a level that is foreign to most students, but typical of what would be required in industry. Automotive industry recruiters come to competition with an eye to hiring students who excel at the innovative thinking and action that Formula Hybrid demands.”
— Raina White, Advisor, Dartmouth Formula Racing

―We look for engineers that will embrace our industry’s rapid evolution. The tech-savvy and multi-disciplined engineers from Formula Hybrid take this challenge in stride.”
— Taha Ramazanoglu, Yale Bulldogs Co-Captain; FH Alum

―Formula Hybrid is an educational experience that provides the tools to develop lifelong skills and high-performing individuals that will grow to excel both technically and operationally at Formula Hybrid and well after.”
— Nathalie Capati, General Motors Engineer; FSAE alumna, FH Alum

ABET, which originally stood for the Accreditation Board for Engineering and Technology, sets standards for and accredits higher education programs in computing, applied and natural science, and engineering technology.

ABET recognized Formula Hybrid founding director Doug Fraser and founding institution Thayer School of Engineering at Dartmouth, for developing a program that challenges teams of engineering students to reach across disciplines to design and construct a fuel-efficient hybrid or electric vehicle, working throughout the academic year to design and build their cars and putting them to the test in a four-day competition.

As of 2018, more than 3,500 students from 80 colleges and universities (54 domestic, 26 international) have participated in Formula Hybrid and hundreds of volunteers from sponsors such as Fiat Chrysler, General Motors, Ford, SAE, IEEE and Toyota have served as mentors and judges.

ABET Innovation Award

After more than a decade of awarding students for engineering ingenuity, Formula Hybrid earned a distinction of its own: the 2018 ABET Innovation Award, which “honors an individual and/or a program or an institutional team that has broken new ground by developing and implementing innovation into an ABET-accredited program.”

ABET, which originally stood for the Accreditation Board for Engineering and Technology, sets standards for and accredits higher education programs in computing, applied and natural science, and engineering technology.

ABET recognized Formula Hybrid founding director Doug Fraser and founding institution Thayer School of Engineering at Dartmouth, for developing a program that challenges teams of engineering students to reach across disciplines to design and construct a fuel-efficient hybrid or electric vehicle, working throughout the academic year to design and build their cars and putting them to the test in a four-day competition.

As of 2018, more than 3,500 students from 80 colleges and universities (54 domestic, 26 international) have participated in Formula Hybrid and hundreds of volunteers from sponsors such as Fiat Chrysler, General Motors, Ford, SAE, IEEE and Toyota have served as mentors and judges.
## Vehicle Specifications

<table>
<thead>
<tr>
<th>Team Name</th>
<th>Car Name</th>
<th>Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team Name</td>
<td>Car Name</td>
<td>Advisor</td>
</tr>
<tr>
<td>Milwaukee School of Engineering</td>
<td>Mozei Motorsports</td>
<td>Dr. Matt Schaefer</td>
</tr>
<tr>
<td>University of Victoria</td>
<td>UVic Formula Hybrid</td>
<td>Dr. Zuomin Dong</td>
</tr>
<tr>
<td>Vellore Institute of Technology</td>
<td>FS Team Uttiejit</td>
<td>Baskar P</td>
</tr>
<tr>
<td>Rochester Institute of Technology</td>
<td>University of Detroit Mercy</td>
<td>Kathleen Lamkin-Kennard</td>
</tr>
</tbody>
</table>

### Thayer School of Engineering at Dartmouth

<table>
<thead>
<tr>
<th>Team Name</th>
<th>Car Name</th>
<th>Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dartmouth Formula Racing (DFR)</td>
<td>Brandy</td>
<td>Rana White</td>
</tr>
</tbody>
</table>

### R.V. College of Engineering

<table>
<thead>
<tr>
<th>Team Name</th>
<th>Car Name</th>
<th>Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashiva Racing</td>
<td>RZKH</td>
<td>Dr. Ravindra S. Kulkarni</td>
</tr>
</tbody>
</table>

### University of Detroit Mercy

<table>
<thead>
<tr>
<th>Team Name</th>
<th>Car Name</th>
<th>Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Detroit Mercy</td>
<td>Titan Motorsports</td>
<td>Thomas Johnson</td>
</tr>
</tbody>
</table>

### Milwaukee School of Engineering

<table>
<thead>
<tr>
<th>Team Name</th>
<th>Car Name</th>
<th>Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mozei Motorsports</td>
<td>Mozei Motorsports</td>
<td>Dr. Matt Schaefer</td>
</tr>
</tbody>
</table>

### University of Victoria

<table>
<thead>
<tr>
<th>Team Name</th>
<th>Car Name</th>
<th>Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>UVic Formula Hybrid</td>
<td>UVH19</td>
<td>Dr. Zuomin Dong</td>
</tr>
</tbody>
</table>

### Vellore Institute of Technology

<table>
<thead>
<tr>
<th>Team Name</th>
<th>Car Name</th>
<th>Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>FS Team Uttiejit</td>
<td>TU 19</td>
<td>Baskar P</td>
</tr>
</tbody>
</table>

### Rochester Institute of Technology

<table>
<thead>
<tr>
<th>Team Name</th>
<th>Car Name</th>
<th>Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot Wheelz</td>
<td>Rosie</td>
<td>Kathleen Lamkin-Kennard</td>
</tr>
</tbody>
</table>

### Moorpark College

<table>
<thead>
<tr>
<th>Team Name</th>
<th>Car Name</th>
<th>Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashwa Racing</td>
<td>RZXH</td>
<td>Dr. Ravindra S. Kulkarni</td>
</tr>
</tbody>
</table>

### University of Detroit Mercy

<table>
<thead>
<tr>
<th>Team Name</th>
<th>Car Name</th>
<th>Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Detroit Mercy</td>
<td>Titan Motorsports</td>
<td>Thomas Johnson</td>
</tr>
</tbody>
</table>

### Thayer School of Engineering at Dartmouth

**DRIVE TYPE**: Hybrid

**ACCUMULATOR**:
- Battery
- In-house
- 2,000 Wh

**DRIVE MOTOR**:
- EMRAX 228
  - 100 kW @ 5,500 RPM

**ENGINE**:
- KTM 250 SX-F
  - 249 cc
  - 35 kW @ 12,500 RPM

**FUEL TYPE**: Gasoline

**GENERATOR**: N/A

**REGEN BRAKING**: None

**WEIGHT**: TBD

**UNIQUE FEATURES**:
- Brand new central vehicle controller designed and coded in-house. Modified and lightened suspension and brake systems. Brand new GLVS system with new PCBs.

---

**University of Victoria**

**DRIVE TYPE**: Hybrid

**ACCUMULATOR**:
- Battery
- In-house
- 3,900 Wh

**DRIVE MOTOR**:
- Parker GU142-100
  - 21 kW @ 6,500 RPM

**ENGINE**:
- SA250
  - 250 cc
  - 10 kW @ 10,500 RPM

**FUEL TYPE**: Gasoline

**GENERATOR**: None

**REGEN BRAKING**: None

**WEIGHT**: TBD

**UNIQUE FEATURES**:

---

**Vellore Institute of Technology**

**DRIVE TYPE**: Hybrid

**ACCUMULATOR**:
- Capacitor
- In-house
- 72 Wh

**DRIVE MOTOR**:
- Saietta 119R
  - 1.8 kW @ 4,000 RPM

**ENGINE**:
- KTM 250 SX-F
  - 249 cc
  - 35 kW @ 12,500 RPM

**FUEL TYPE**: Gasoline

**GENERATOR**: None

**REGEN BRAKING**: Rear

**WEIGHT**: 251 kg

**UNIQUE FEATURES**:
- Our capacitors give our vehicle’s electrical system an amazing specific power and only take one lap of UVic’s parking lot to recharge!

---

**Rochester Institute of Technology**

**DRIVE TYPE**: Hybrid

**ACCUMULATOR**:
- Battery
- Samsung
- 2,016 Wh

**DRIVE MOTOR**:
- Emrax 228M/K
  - 100 kW @ 5,500 RPM

**ENGINE**:
- Briggs & Stratton World Formula
  - 204 cc
  - 33 kW @ 7,100 RPM

**FUEL TYPE**: Gasoline

**GENERATOR**: N/A

**REGEN BRAKING**: Rear

**WEIGHT**: 249.9 kg

**UNIQUE FEATURES**:
- Carbon fiber seat. 3D printed steering wheel. Custom made battery packs. Telemetry system

---

**Milwaukee School of Engineering**

**DRIVE TYPE**: Hybrid

**ACCUMULATOR**:
- Battery
- Samsung
- 2,000 Wh

**DRIVE MOTOR**:
- EMRAX 228
  - 100 kW @ 5,500 RPM

**ENGINE**:
- KTM 250 SX-F
  - 249 cc
  - 35 kW @ 12,500 RPM

**FUEL TYPE**: Gasoline

**GENERATOR**: None

**REGEN BRAKING**: Rear

**WEIGHT**: 249.9 kg

**UNIQUE FEATURES**:
- Carbon fiber seat. 3D printed steering wheel. Custom made battery packs. Telemetry system

---

**University of Detroit Mercy**

**DRIVE TYPE**: Hybrid

**ACCUMULATOR**:
- Battery
- Technigenic Technologies
- 4,158 Wh

**DRIVE MOTOR**:
- Honda CBR 250
  - 19 kW @ 8,500 RPM

**ENGINE**:
- KTM DUKE 200
  - 199.5 cc
  - 13.23 kW @ 7,500 RPM

**FUEL TYPE**: Gasoline

**GENERATOR**: None

**WEIGHT**: TBD

**UNIQUE FEATURES**:
<table>
<thead>
<tr>
<th>Team Name</th>
<th>Vehicle Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois Tech Motorsports</td>
<td>DRIVE TYPE: Electric ACCUMULATOR: Battery A123 4,364 Wh * DRIVE MOTOR: Molerenergy ME 1616 55 kW @ 3,300 RPM ENGINE: N/A FUEL TYPE: Gasoline GENERATOR: N/A REGEN BRAKING: Rear WEIGHT: 318 kg * UNIQUE FEATURES: We designed the car from the ground up for our University's first appearance at the Formula Hybrid competition.</td>
</tr>
<tr>
<td>Lafayette Motorsports</td>
<td>DRIVE TYPE: Electric ACCUMULATOR: Battery AA Portable Power Corp. 5,176 Wh DRIVE MOTOR: (2) Emrax 188 70 kW @ 8,500 RPM ENGINE: N/A FUEL TYPE: N/A GENERATOR: N/A REGEN BRAKING: Rear WEIGHT: 250 kg UNIQUE FEATURES: TBD</td>
</tr>
<tr>
<td>Princeton Racing Electric</td>
<td>DRIVE TYPE: Electric ACCUMULATOR: Battery In-house 6.2 kWh nominal 4.9 kWh @ 2C DRIVE MOTOR: (4) DHK Electric Machines, Inc Hawk 20 Front Drive, Hawk 40 Rear Drive 96.4 kW @ 4,400 RPM ENGINE: N/A FUEL TYPE: N/A GENERATOR: N/A REGEN BRAKING: Front, Rear WEIGHT: 225 kg UNIQUE FEATURES: Quad independent 85kW front/rear SMPM hub-mounted motors.</td>
</tr>
<tr>
<td>Wyoming Motorsports</td>
<td>DRIVE TYPE: Electric ACCUMULATOR: Battery In-house 4,300 Wh * DRIVE MOTOR: (4) DHX Electric Machines, Inc Hawk 20 Front Drive, Hawk 40 Rear Drive 90.4 kW @ 4,400 RPM ENGINE: N/A FUEL TYPE: N/A GENERATOR: N/A REGEN BRAKING: Front, Rear WEIGHT: 225 kg UNIQUE FEATURES: Quad independent 85kW front/rear SMPM hub-mounted motors.</td>
</tr>
<tr>
<td>Hybrid Warriors</td>
<td>DRIVE TYPE: Electric ACCUMULATOR: Battery AA Portable Power Corp. 4,608 Wh * DRIVE MOTOR: Emraex 228 MV LC 80 kW @ 3,500 RPM ENGINE: N/A FUEL TYPE: N/A GENERATOR: N/A REGEN BRAKING: Rear WEIGHT: 300 kg UNIQUE FEATURES: We designed the car from the ground up for our University's first appearance at the Formula Hybrid competition.</td>
</tr>
<tr>
<td>Alternative Energy Racing</td>
<td>DRIVE TYPE: Electric ACCUMULATOR: Battery AA Portable Power Corp. 5,376 Wh * DRIVE MOTOR: (2) HPEVS AC-31 25 kW @ 6,000 RPM ENGINE: N/A FUEL TYPE: N/A GENERATOR: N/A REGEN BRAKING: Rear WEIGHT: 250 kg* UNIQUE FEATURES: Comprehensive vehicle telemetry and data acquisition system.</td>
</tr>
<tr>
<td>Illinois Institute of Technology</td>
<td>DRIVE TYPE: Electric ACCUMULATOR: Battery In-house 4,300 Wh * DRIVE MOTOR: Emraex 208 80 kW @ 4,000 RPM ENGINE: N/A FUEL TYPE: N/A GENERATOR: N/A REGEN BRAKING: Rear WEIGHT: 225 kg UNIQUE FEATURES: Lafayette College Electrical and Computer Engineering Department manufactured accumulators.</td>
</tr>
<tr>
<td>Voltron</td>
<td>DRIVE TYPE: Electric ACCUMULATOR: Battery AA Portable Power Corp. 5,176 Wh DRIVE MOTOR: Emraex 228 MV LC 80 kW @ 3,500 RPM ENGINE: N/A FUEL TYPE: N/A GENERATOR: N/A REGEN BRAKING: Rear WEIGHT: 300 kg UNIQUE FEATURES: Lafayette College Electrical and Computer Engineering Department manufactured accumulators.</td>
</tr>
</tbody>
</table>
### Tufts University

**Team Name**: Tufts Electric Racing  
**Car Name**: TER10  
**Advisor**: William Meissner, Ph.D.

#### Vehicle Specifications

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Accumulator</th>
<th>Drive Motor</th>
<th>Engine</th>
<th>Fuel Type</th>
<th>Generator</th>
<th>Regen Braking</th>
<th>Weight</th>
<th>Unique Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>Battery</td>
<td>Saietta 119R</td>
<td>13.42 kW @ 6,000 RPM</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
<td>240 kg</td>
<td>Cost-efficient. Readily available spare parts.</td>
</tr>
</tbody>
</table>

**TER10** features a fully custom steering wheel with built-in display and a unique turnbuckle-style mounting system for our differential that doubles as chain tensioner.

### Rensselaer Polytechnic Institute

**Team Name**: Rensselaer Formula Hybrid  
**Car Name**: VMR-X  
**Advisor**: George Gela

#### Vehicle Specifications

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Accumulator</th>
<th>Drive Motor</th>
<th>Engine</th>
<th>Fuel Type</th>
<th>Generator</th>
<th>Regen Braking</th>
<th>Weight</th>
<th>Unique Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>Battery</td>
<td>(4) Neumotors 8057 (2x), 8038 (2x)</td>
<td>45 kW</td>
<td>N/A</td>
<td>N/A</td>
<td>Front, Rear</td>
<td>250 kg</td>
<td>Active rear wing. Custom carbon fiber body kit and diffuser. 4-wheel drive with electronic differential. 440 cell Li-ion battery.</td>
</tr>
</tbody>
</table>

**VMR-X** features a fully custom steering wheel with built-in display and a unique turnbuckle-style mounting system for our differential that doubles as chain tensioner.

### Indiana University Purdue University Indianapolis

**Team Name**: Jaguars  
**Car Name**: The Ghost  
**Advisor**: Jing Zhang

#### Vehicle Specifications

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Accumulator</th>
<th>Drive Motor</th>
<th>Engine</th>
<th>Fuel Type</th>
<th>Generator</th>
<th>Regen Braking</th>
<th>Weight</th>
<th>Unique Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>Battery</td>
<td>EV WEST 1010</td>
<td>13.42 kW @ 6,000 RPM</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
<td>240 kg</td>
<td>Cost-efficient. Readily available spare parts.</td>
</tr>
</tbody>
</table>

**The Ghost** features a fully custom steering wheel with built-in display and a unique turnbuckle-style mounting system for our differential that doubles as chain tensioner.

### Boston University

**Team Name**: Boston University Racing  
**Car Name**: HY4  
**Advisor**: Peter Zink

#### Vehicle Specifications

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Accumulator</th>
<th>Drive Motor</th>
<th>Engine</th>
<th>Fuel Type</th>
<th>Generator</th>
<th>Regen Braking</th>
<th>Weight</th>
<th>Unique Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>Battery</td>
<td>Yasa 400</td>
<td>60 kW @ 2,000 RPM</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
<td>348 kg (with driver)*</td>
<td>In-house pouch cell accumulators. Custom self-built wheel assemblies. In-house fiberglass nosecone.</td>
</tr>
</tbody>
</table>

**Hy4** features a fully custom steering wheel with built-in display and a unique turnbuckle-style mounting system for our differential that doubles as chain tensioner.

### Lawrence Technological University

**Team Name**: Blue Devil Motorsports  
**Car Name**: LE19  
**Advisors**: Hamid Vejdani and Gary Lowe

#### Vehicle Specifications

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Accumulator</th>
<th>Drive Motor</th>
<th>Engine</th>
<th>Fuel Type</th>
<th>Generator</th>
<th>Regen Braking</th>
<th>Weight</th>
<th>Unique Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>Battery</td>
<td>Yusa 400</td>
<td>60 kW @ 2,000 RPM</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
<td>250 kg</td>
<td>TER10 features a fully custom steering wheel with built-in display and a unique turnbuckle-style mounting system for our differential that doubles as chain tensioner.</td>
</tr>
</tbody>
</table>

**LE19** features a fully custom steering wheel with built-in display and a unique turnbuckle-style mounting system for our differential that doubles as chain tensioner.

### Amrita Institute of Tech and Science

**Team Name**: Asta Racing  
**Car Name**: ARV-1  
**Advisor**: Mr. Srikanth V

#### Vehicle Specifications

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Accumulator</th>
<th>Drive Motor</th>
<th>Engine</th>
<th>Fuel Type</th>
<th>Generator</th>
<th>Regen Braking</th>
<th>Weight</th>
<th>Unique Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>Battery</td>
<td>Saietta 119R</td>
<td>13.42 kW @ 6,000 RPM</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
<td>240 kg</td>
<td>Nothing done unusual. Really trying to make a solid, simple working electric vehicle for future teams to get more unusual with down the road.</td>
</tr>
</tbody>
</table>

**ARV-1** features a fully custom steering wheel with built-in display and a unique turnbuckle-style mounting system for our differential that doubles as chain tensioner.

### Georgia Institute of Technology

**Team Name**: HT04  
**Car Name**: HY4  
**Advisor**: Dr. Lukas Graber

#### Vehicle Specifications

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Accumulator</th>
<th>Drive Motor</th>
<th>Engine</th>
<th>Fuel Type</th>
<th>Generator</th>
<th>Regen Braking</th>
<th>Weight</th>
<th>Unique Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>Battery</td>
<td>Saietta 119R</td>
<td>13.42 kW @ 6,000 RPM</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
<td>240 kg</td>
<td>Nothing done unusual. Really trying to make a solid, simple working electric vehicle for future teams to get more unusual with down the road.</td>
</tr>
</tbody>
</table>

**HT04** features a fully custom steering wheel with built-in display and a unique turnbuckle-style mounting system for our differential that doubles as chain tensioner.

### Blue Devil Motorsports

**Team Name**: Blue Devil Motorsports  
**Car Name**: LE19  
**Advisors**: Hamid Vejdani and Gary Lowe

#### Vehicle Specifications

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Accumulator</th>
<th>Drive Motor</th>
<th>Engine</th>
<th>Fuel Type</th>
<th>Generator</th>
<th>Regen Braking</th>
<th>Weight</th>
<th>Unique Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>Battery</td>
<td>Yusa 400</td>
<td>60 kW @ 2,000 RPM</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
<td>250 kg</td>
<td>TER10 features a fully custom steering wheel with built-in display and a unique turnbuckle-style mounting system for our differential that doubles as chain tensioner.</td>
</tr>
</tbody>
</table>

**LE19** features a fully custom steering wheel with built-in display and a unique turnbuckle-style mounting system for our differential that doubles as chain tensioner.

### Boston University

**Team Name**: Boston University Racing  
**Car Name**: HY4  
**Advisor**: Peter Zink

#### Vehicle Specifications

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Accumulator</th>
<th>Drive Motor</th>
<th>Engine</th>
<th>Fuel Type</th>
<th>Generator</th>
<th>Regen Braking</th>
<th>Weight</th>
<th>Unique Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>Battery</td>
<td>Yasa 400</td>
<td>60 kW @ 2,000 RPM</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
<td>348 kg (with driver)*</td>
<td>In-house pouch cell accumulators. Custom self-built wheel assemblies. In-house fiberglass nosecone.</td>
</tr>
</tbody>
</table>

**Hy4** features a fully custom steering wheel with built-in display and a unique turnbuckle-style mounting system for our differential that doubles as chain tensioner.
ONE BOLD VISION FOR THE FUTURE

Join General Motors to help us create a world with zero crashes, zero emissions and zero congestion with safer, simpler and better mobility solutions. We are committed to transforming the way the world moves, and we’re looking for passionate people who can help make our bold vision a reality.

careers.gm.com     ©2019 General Motors. All rights reserved.
Welcome to a Brighter Future

Why can’t we create enough clean energy to sustain human-kind and the entire planet?
Why can’t we look forward to a day where clean energy alone powers the future?
We can, because we constantly challenge ourselves to create new, imaginative and innovative ways to harness natural energy sources.
Say hello to a better tomorrow.

Who said hybrids were boring?

Toyota is proud to continue our support of the Formula Hybrid Student Competition.

TOYOTA
Toyota.com/usa/careers

2018 Le Mans 24 Hours Winner
Toyota TS050 Hybrid

Who said hybrids were boring?

2017 World Endurance Championship
Toyota TS050 Hybrid

2018 Lexus LC500h

2018 Lexus LS500h

Toyota is proud to continue our support of the SAE Formula Hybrid Student Competition.

http://www.Toyota.com/usa/careers

ELECTRIFYING THE FUTURE

At AVL, we love to solve problems. As a global leader in electrification development and testing, AVL provides innovative solutions to the industry’s most complex challenges.

Find out what our experts are working on now
avl.com/electrification

To learn more about AVL, visit us at:

AVL Headquarters in North America
47603 Halyard Drive, Plymouth, MI 48170
WHERE WICKED SMART MEETS WICKED FAST!

JULY 21 MONSTER MONDAY FOXWOODS RESORT CASINO 301 THE CAN’T MISS SUMMER RACING PARTY!

www.NHMS.com 855-4NH-RACE

GRADUATING?
Get a year of professional membership FREE.

You belong here with the best and brightest in the mobility engineering community. Professional members can:
• Seek advice directly from industry veterans and more via Member Connection at connection.sae.org
• Utilize discounts on technical resources (books, events, trainings)
• And more...

Visit sae.org/membership for a complete list of benefits.
Email membershipteam@sae.org with any questions.

TestEquity

• Test Equipment
• Electronic Production Supplies
• Environmental Chambers
• Tool Kits

Our areas of expertise

The New Intralinks. Virtually Perfect.
Protecting information in motion in the cloud and beyond
ACKNOWLEDGEMENTS

We would like to thank all of the volunteers for their time and generous support. Their hard work and dedication make the event possible.

We greatly appreciate all of their contributions and support and know that the event would not have been possible without them. Thanks again!