

2018 COMPETITION







competition **Schedule**



12thannual

Welcome to the 12th annual Formula Hybrid International Competition!

We are delighted that 25 teams have registered for competition this year, including all of the 21 teams that competed last year. We're looking forward to seeing what our new teams have been working on and the progress our returning teams have made.

We are also pleased to announce a new prize: the Test Equity "Hit the Ground Running" award. It will recognize the two teams who arrive at competition with cars most ready to get on track honoring students' success in project management as well as their technical achievements.

Our thanks to all Formula Hybrid participants and volunteers for keeping this interdisciplinary learning experience moving forward and for helping to improve and advance automotive engineering for all.

Jay Froser

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Formula Hybrid Competition Organizers

arcia

Sydney Garcia Coordinating Manager sydney@formula-hybrid.org

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



Spotlight

SCCA Volunteers Help Drive Formula Hybrid Success



The mix of energy, action, and skill calls them to the track. Contributing to the education of the automotive industry's future leaders is payment enough. Members of the New England Region (NER) of the Sports Car Club of America (SCCA) have volunteered to help run the tests and dynamic events at Formula Hybrid since the competition's inception a dozen years ago.

"We set up the acceleration runs, we set up the autocross, we set up the endurance course, and our people run the brake testing for the hybrid series," explains William Fralick, dynamic events captain for the NER.



Interviewed at the New Hampshire International Speedway during Formula Hybrid 2017, Fralick and other members of the club reflected on Formula Hybrid and its student competitors. "They seem to work together tremendously, a lot of great ideas," Fralick says of the teams. "They're learning skills that they're going to take out to the business world."

Formed in 1944 as a group for racing enthusiasts, the SCCA today is an automobile club and sanctioning body supporting road racing, rallying, and autocross, both amateur and professional, throughout the United States. The club is organized into nine divisions and 115 regions.

Kathy Barnes is a member of the events team for the New England Region SCCA. "It's like my family," she says of the club.

Barnes says she enjoys participating in Formula Hybrid for the chance to see the young men and women flexing their engineering muscles and gaining skills that will benefit them long after the competition is over.

"The students don't just hone their engineering skills; they learn to work as a team toward a goal, and to work within their budgets, while using their creativity," she says. "When they leave college and they go into business, working for other companies, they're going to take every one of those skills with them. It's so much more than just studying."

As someone who has worked on advanced automotive technologies for his entire career, Phil Gott views

Formula Hybrid as a way for motorsports to "contribute to the advancement of mobility." Gott, an SCCA member since 1968, find himself naturally drawn to racetrack.

"I've been a motor head for as long as I can remember," he says. "I find the combination of mental strategy, mechanical preparation, and skill on the track to be a very seductive combination."

Wiley Cox, a NER member of SCCA since 2004, has worked every Formula Hybrid competition except for one. He says he hopes that in addition to gaining a sense of the skill and preparation required to compete, the students enjoy the experience and have as much fun as he does as a volunteer.

"We love coming here," he says. "We love being able to help, and we hope you invite us back next year."

Doug Fraser, founder and lead organizer of Formula Hybrid, says the competition wouldn't be possible without the dedication and commitment of the club and its members.

"We really appreciate the club and all the hard work the members put in to help us run this competition," says Fraser. "Without them, we wouldn't be able to give the students this unique educational experience."



For more information about the NER chapter of the SCCA, or to get involved, please visit www.ner.org/race-volunteer.

data specifications



Thayer School of Engineering at Dartmouth

Team Name	Dartmouth Formula Racing (DFR)
Car Name	Jessica II
Advisor	Raina White



Vehicle Specifications

DRIVE TYPE	Hybrid
ACCUMULATOR	Battery In-house 2,000 W∙h
DRIVE MOTOR	EMMRAX 228 1000 kW @ 5,000 RPM
ENGINE	KTM 250 SXF 249.9 cc 30 kW @ 14,000 RPM
FUEL TYPE	Gasoline
GENERATOR	
REGEN BRAKING	
WEIGHT	400 kg
UNIQUE FEATURES	Modular powertrain (powertrain test bench fits into chassis). Single-enclosure accumulator system. Custom HV and LV PCBs. Carbon fiber body.

Milwaukee School of Engineering

Team Name	Mozee Motorsports
Car Name	MP5
Advisor	Matthew Schaefer



Vehicle Specifications

DRIVE TYPE	Hybrid
ACCUMULATOR	Battery 4,110 W∙h
DRIVE MOTOR	Parker GVM142-100 35.8 kW* @ 6,500 RPM
ENGINE	Swiss Auto SA250 250 cc 30 kW @ 10,500 RPM
FUEL TYPE	Gasoline
GENERATOR	N/A
REGEN BRAKING	None
WEIGHT	341 kg*
UNIQUE FEATURES	Spaceframe Chassis with Octagon Bars. Single Speed Transmission. MSOE Co-Developed Energus Accumulator Modules. Custom Poured Race Seat.

University of Michigan Ann Arbor

	Michigan Hybrid Racing
Car Name	MHR-18
Advisor	Heath Hofmann



Vehicle Specifications

DRIVE TYPE	Hybrid
ACCUMULATOR	Battery Michigan Hybrid Racing 3,686 W∙h
DRIVE MOTOR	(2) Plettenberg Nova 15 30 kW @ 10,000 RPM
	KTM 250 SX-F 249.9 cc 31.3 kW @ 13,500 RPM
FUEL TYPE	Gasoline
GENERATOR	N/A
REGEN BRAKING	Front
WEIGHT	650 kg
UNIQUE FEATURES	Two independent HV systems. In-hub front wheel drive. Engine tuning through ECU programming. Aerodynamics package. Integrated system cooling.



R.V. College of Engineering

Ashwa Racing RZX7-H



Vehicle Specifications

DRIVE TYPE	Hybrid	
ACCUMULATOR	Battery Liyuan Batteries 2,949 W∙h	
DRIVE MOTOR	Saietta Agni Motors 119R 15.8 kW @ 2,850 RPM	
	Honda CBR 250 249 cc 19 kW @ 8,500 RPM	
FUEL TYPE	Gasoline	
GENERATOR	Saietta Agni Motors 95R	
REGEN BRAKING	None	
WEIGHT	300 kg*	
UNIQUE FEATURES	Series Hybrid. Electronic Throttle Control. Electro-Pneumatic Clutch. Active Balancing BMS. Modular Accumulator Container.	

SRM Engineering College

Hybrutos Racing
Beta V2.0
Dr. P. Nandakumar



Vehicle Specifications

DRIVE TYPE	Hybrid
ACCUMULATOR	Battery Winston Battery Ltd. 1,917 W•h
DRIVE MOTOR	Agni Motors 95R 26 kW @ 4,500 RPM
ENGINE	KTM Duke 200 199.5 cc 18.35 kW @ 10,000 RPM
FUEL TYPE	Gasoline
GENERATOR	N/A
REGEN BRAKING	None
WEIGHT	265 kg
UNIQUE FEATURES	Switchable mode Powertrain Coupling. Aramid Fiber Accumulator Container. Carbon Fiber Bodywork. Data recoverable using Telemetry.

Lawrence Technological University

Team Name	Blue Devil Motorsports
Car Name	LH-18
Advisor	Dr. Xin Xie



Vehicle Specifications

DRIVE TYPE	Hybrid	
ACCUMULATOR	Battery A123 2,310 W∙h	
DRIVE MOTOR	Electric Motorsports, Inc DLC-28 38 kW @ 6,500 RPM	
ENGINE	KTM 250 SX-F 249 cc 28 kW @ 13,700 RPM	
FUEL TYPE	Gasoline	
GENERATOR	N/A	
REGEN BRAKING	None	
WEIGHT	385.55 kg	
UNIQUE FEATURES		

Binghamton University

	Bearcat Motorsports
Car Name	2 Chainz
Advisor	David Pavlick



Vehicle Specifications

DRIVE TYPE	Hybrid
ACCUMULATOR	Battery 2,520 W∙h
DRIVE MOTOR	HPEVS AC 20-08.52 11.2 kW @ 2,200 RPM
	Kawasaki Ninja 250R EXJ 250 cc 22.36 kW @ 11,000 RPM
FUEL TYPE	Gasoline
GENERATOR	N/A
REGEN BRAKING	Rear
WEIGHT	
UNIQUE FEATURES	Dual Input Drivetrain, Custom Built Accumulators and AMS, Air Dampers,

Sophisticated HUD GUI

data specifications

Rensselaer Polytechnic Institute

 Team Name
 Rensselaer Formula Hybrid

 Car Name
 VMR-X

 Advisor
 Jeffrey Braunstein



Vehicle Specifications

DRIVE TYPE	Hybrid
ACCUMULATOR	Battery 3,800 W∙h
DRIVE MOTOR	(4) Neumotors 2x 8057 / 2x 8038 30 kW @ 8,000 RPM
	Briggs & Stratton World Formula 204 cc 8.6 kW @ 7,100 RPM
FUEL TYPE	Gasoline
GENERATOR	Neumotors 8057
REGEN BRAKING	Front, Rear
WEIGHT	280 kg*
UNIQUE FEATURES	Active rear wing. Carbon fiber body. Telemetry system. 440 cell li-ion battery. Custom AMS. 4-wheel drive with electronic differential.

University of Victoria

Team Name	UVic Hybrid
Car Name	UVH2018
Advisor	Dr. Zuomin Dong



Vehicle Specifications

DRIVE TYPE	Hybrid
ACCUMULATOR	Capacitor UVic Hybrid 72 W·h
DRIVE MOTOR	Saietta 119R 20 kW @ RPM
ENGINE	KTM 250 SX-F 250 cc 41.7 kW @ 12,500 RPM
FUEL TYPE	Gasoline
GENERATOR	
REGEN BRAKING	Rear
WEIGHT	300 kg
UNIQUE FEATURES	Ultracap Accumulator mounted directly below the driver. Telemetry system broadcasts real-time performance data.

Rochester Institute of Technology

Team Name	Hot Wheelz Formula Hybrid
Car Name	Diana 🚽 🖉 🔊
Advisor	Kathleen Lamkin-Kennard, Martin Schooping, Sarah Burke

Vehicle Specifications

DRIVE TYPE	Hybrid
ACCUMULATOR	Battery KeepPower IMR26650 5200mAh 4,432 W•h
DRIVE MOTOR	Emrax 228MV 100 kW @ 5,500 RPM
ENGINE	Briggs & Stratton World Formula 204 cc 8.23 kW @ 7,100 RPM
FUEL TYPE	Gasoline
GENERATOR	Emrax 188MV
REGEN BRAKING	Rear
WEIGHT	453 kg*
UNIQUE FEATURES	Telemetry system. Custom accumulator. Solvent-bonded polycarbonate battery box. GLV sourced from accumulator power. Carbon fiber bodywork.

University of Houston

	Harvey Hybrid
Car Name	Harvey
Advisor	Dr. Burak Basasaran



Vehicle Specifications	
DRIVE TYPE	Hybrid
ACCUMULATOR	Battery Panasonic 92.5 W·h
DRIVE MOTOR	Hi performance Golf Cars AC 12-03.27 4.472 kW @ 6,800 RPM
	Subaru EX 21 211 cc 4.4 kW @ 3,050 RPM
FUEL TYPE	Gasoline
GENERATOR	Mecc Alte S15W-45
REGEN BRAKING	Rear
WEIGHT	274.5 kg
UNIQUE FEATURES	Ford Fusion accumulators. Mono-shock front end. I.C. engine with torque converter to power the generator at idle and engage TS at higher rpms.

* Estimated Value

University of Detroit Mercy

Team Name University of Detroit Mercy
Car Name Titan Motorsports

Vehicle Specifications



Vellore Institute of Technology

Team NameTeam UttejitCar NameTU-18AdvisorProf. Ashok B



Vehicle Specifications

DRIVE TYPE	Hybrid	
ACCUMULATOR	Battery Genuine Powers 4,416 W•h	1
DRIVE MOTOR	Saietta Agni 119R 19.3 kW @ 3,460 RPM	
ENGINE	KTM DUKE 250 249 cc 22.5 kW @ 9,000 RPM	
FUEL TYPE	Gasoline	
GENERATOR	Saietta Agni 119R	
REGEN BRAKING	Rear	
WEIGHT	250 kg*	
UNIQUE FEATURES	State-of-Charge based motor boost.	

Princeton University

Team Name	Princeton Racing Electric
Car Name	The Hafeez
Advisor	Luigi Martinelli

Vehicle Specifications

DRIVE TYPE	Electric
ACCUMULATOR	Battery Energus
DRIVE MOTOR	(2) Parker GVM142 36 kW @ 6,000 RPM
ENGINE	N/A
FUEL TYPE	N/A
GENERATOR	N/A
REGEN BRAKING	None
WEIGHT	250 kg*
UNIQUE FEATURES	Independent rear wheel drive motors



data specifications



Boston University

Team Name	Boston University Racing
Car Name	Stella
Advisor	Peter Zink

Vehicle Specifications

DRIVE TYPE	Electric
ACCUMULATOR	Battery Custom 3,280 W·h
DRIVE MOTOR	(2) Zero Motorcycles FX 75-5 33.5 kW @ 4,000 RPM
ENGINE	N/A
FUEL TYPE	N/A
GENERATOR	N/A
REGEN BRAKING	Rear
WEIGHT	348 kg (with driver)*
UNIQUE FEATURES	Custom accumulators with LiFePO4 pouch cells.

University of Vermont

Team Name	Alternative Energy Racing Organization
Car Name	CleanSpeed 3.5
Advisor	Dustin Rand

Vehicle Specifications

DRIVE TYPE	Electric
ACCUMULATOR	Battery GBS 5,222 W·h
DRIVE MOTOR	(2) Lynch D95B 2x2 60 kW @ 6,000 RPM
ENGINE	N/A
FUEL TYPE	N/A
GENERATOR	N/A
REGEN BRAKING	None
WEIGHT	385 kg
UNIQUE FEATURES	Parallel-series electric transmission. Full telemetry and data acquisition system, located under the driver battery pack.

Yale University

	Bulldogs Racing
Car Name	BR16
Advisor	Joseph Zinter



Vehicle Specifications

DRIVE TYPE	Electric
ACCUMULATOR	Battery
DRIVE MOTOR	(2) Enstroj Emrax 207 Medium Voltage 40 kW @ 5,000 RPM
	N/A
FUEL TYPE	N/A
GENERATOR	N/A
REGEN BRAKING	None
WEIGHT	225 kg
UNIQUE FEATURES	Independent rear-wheel drive. Vintage aesthetic style. Electronic differential. Traction control with torque vectoring. Data acquisition.





	Illinois Tech Motorsports	11. 51
Car Name	Hawk S18	NAAR DIKALANGKAN
Advisor	Dr. Mahesh Krishnamurth	and the state of the second state of the secon



Tufts University

Team Name	Tufts Electric Racing
Car Name	TER 9
Advisor	William Messner, Ph.D.



* Estimated Value

Vehicle Specifications

DRIVE TYPE	Electric
ACCUMULATOR	Battery Headway-Headquarters, LLC 3,504 W·h
DRIVE MOTOR	Enstroj Emrax 228 100 kW @ 5,500 RPM
ENGINE	N/A
FUEL TYPE	N/A
GENERATOR	ENSTROJ Emrax 228
REGEN BRAKING	Rear
WEIGHT	300 kg
UNIQUE FEATURES	Steering wheel with custom display. Adjustable pedal box. Custom LV electrical board. Liquid cooled seat. Turnbuckle chain tensioning system.

Vehicle Specifications

DRIVE TYPE	Electric
ACCUMULATOR	Battery Custom 5,370 W∙h
DRIVE MOTOR	Emrax 208 80 kW @ 6,000 RPM
	N/A
FUEL TYPE	N/A
GENERATOR	N/A
REGEN BRAKING	Rear
WEIGHT	250 kg*
UNIQUE FEATURES	Servo controlled active wings. Low internal resistance accumulator (no cooling required). Addition of planetary gearbox for gear reduction.

Lafayette College

Team Name	Lafayette Motorsports
Car Name	Marv
Advisor	Jeffrey Helm

Vehicle Specifications

DRIVE TYPE	Electric
ACCUMULATOR	Battery Lafayette College Electrical Engineering Department 4,500 W∙h
DRIVE MOTOR	HPEVS AC50-27.28.11 53.47 kW @ 3,500 RPM
ENGINE	N/A
FUEL TYPE	N/A
GENERATOR	N/A
REGEN BRAKING	None
WEIGHT	430 kg
UNIQUE FEATURES	Carbon Fiber Nose Cone. 4130 Steel tubular space frame. Lafayette College Manufactured Accumulators

Atilim University

	Atilgan
Car Name	Atilgan
Advisor	Prof. Dr. Demir Bayka



Vehicle Specifications	
DRIVE TYPE	Electric
ACCUMULATOR	Battery Winston 2,880 W·h
DRIVE MOTOR	(2) LMC LEM - 200 25.38 kW @ 3,600 RPM
	N/A
FUEL TYPE	N/A
GENERATOR	N/A
REGEN BRAKING	None
WEIGHT	290 kg*
UNIQUE FEATURES	

data specifications

* Estimated Value

Indiana University Purdue University Indianapolis

Team NameIUPUI TEAMCar NameJaguarsAdvisorJing Zhang



Vehicle Specifications

DRIVE TYPE	Hybrid
ACCUMULATOR	Battery Curtis 3,148 W·h
DRIVE MOTOR	HPEVS AC 9 37.285 kW @ 10,000 RPM
	N/A
FUEL TYPE	Ethanol
GENERATOR	N/A
REGEN BRAKING	Front, Rear
WEIGHT	460 kg
UNIQUE FEATURES	

Amrita Institute of Tech and Science

Team NameFormula AgraganyaCar NameTrishulAdvisorSreekanth v



Vehicle Specifications

DRIVE TYPE	Electric
ACCUMULATOR	Battery Thunder Sky Winston Energy 4,800 W•h
DRIVE MOTOR	Saietta Agni 95 10 kW @ 3,200 RPM
ENGINE	N/A
FUEL TYPE	N/A
GENERATOR	N/A
REGEN BRAKING	Rear
WEIGHT	250 kg
UNIQUE FEATURES	Cost effective

Wayne State University

Team Name	Wayne State Motorsports
Car Name	
Advisor	Dr. Gene Liao

Vehicle Specifications

DRIVE TYPE	Electric
ACCUMULATOR	Battery EiG 370 W·h
DRIVE MOTOR	Motenergy DLC-28/ME-13 <mark>0</mark> 2 38 kW @ 5,000 RPM
ENGINE	N/A
FUEL TYPE	N/A
GENERATOR	N/A
REGEN BRAKING	Rear
WEIGHT	272.72 kg
UNIQUE FEATURES	



Georgia Institute of Technology

	HyTech Racing
Car Name	НТ03В
Advisor	Dr. Jonathan Rogers



Vehicle Specifications

DRIVE TYPE	Electric
ACCUMULATOR	Battery 5,860 W·h
DRIVE MOTOR	Enstroj Emrax 207 80 kW @ 6,000 RPM
	N/A
FUEL TYPE	N/A
GENERATOR	N/A
REGEN BRAKING	Rear
WEIGHT	181 kg*
UNIQUE FEATURES	

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