
FORMULA
HYBRID
THE FUTURE ON TRACK.

OVERVIEW

- Falls under the FSAE design series and are international
- $2,250 to register to compete
- Approximately $6,000 for travel with 22 members traveling (2 vans, 2 trailers)

Formula Hybrid	Formula Electric

○ Founded in 2006 through Dartmouth, IEEE, and SAE
  • FIT attended in 2008,and 2009
  • Three categories:
  ▪ All electric
  ▪ Hybrid in Progress
  ▪ Hybrid
○ Held in NH in the Spring (May)
○ Max teams allowed 35
○ Regarded as the hardest FSAE competition (9 Teams passed Technical inspection)
○ Has its own rule book
	○ Started in 2013
	○ IC and EV event held at the same time
	○ FIT has not gone for IC or EV
	○ Only 30 EV teams aloud to register
	○ Held in NB in the Summer (June)

OVERVIEW

Both are interdisciplinary design and engineering challenges for undergraduate and graduate university students. Where students must collaboratively design and build a formula-style electric or plug-in hybrid racecar and compete in a series of events. The educational competition emphasizes drivetrain innovation and fuel efficiency in a high-performance application

Events

Formula Hybrid	Formula Electric
• Design • Sustainability Report • Project Management • AutoX • Endurance • Acceleration	○ Started in 2013 ○ IC and EV event held at the same time ○ FIT has not gone for IC or EV ○ Only 30 EV teams aloud to register ○ Held in NB in the Summer (June)

Engineering Challenges

- Project management & collaboration
- High-power electronics
- Mechanical systems
- Internal combustion engines
- Regenerative braking systems
- Computerized systems control
- Data acquisition

Engineering Challenges

2017 Formula Hybrid Summary Score Sheet

Car No.	School	Presentation Event	Design Event	Accel - Electric	Accel - Unrestricted	Autocross Event	Endurance Event	Applied Document Penalties	Document Submittal Bonus & Penalty (2)	Total Score	Passed Tech	Position in Class	Comments
		100.00	200.00	75.00	75 (1)	150.00	400.00			1000H / 925E			
Hybrid Drive Class													
2	Milwaukee School of Engineering	85.98	153.50	0.00	75.00	150.00	400.00	20.00	20.00	884.49	Yes	1	
16	RV College of Engineering	94.32	150.52	75.00	15.00	84.31	80.00	40.00	40.00	539.15	Yes	2	
11	SRM Engineering College	67.80	200.00	0.00	0.00	0.00	0.00	10.00	10.00	277.80	Yes	3	
19	Dartmouth College	78.64	181.82	0.00	0.00	0.00	0.00	8.00	8.00	268.45	Yes	4	Electrical drive failure
20	University of Michigan Ann Arbor	69.70	186.36	0.00	0.00	0.00	0.00	10.00	10.00	266.06	Yes	5	
15	Lawrence Technological University	100.00	143.57	0.00	0.00	0.00	0.00	-10.00	-10.00	233.57	Yes	6	Broken drive chain
14	Binghamton Univ	66.29	160.95	0.00	0.00	0.00	0.00	-30.00	-30.00	197.24	No	7	Electrical system failure
18	Rensselaer Polytechnic Institute	62.88	108.79	0.00	0.00	0.00	0.00	20.00	20.00	191.67	No	8	GLV Issues
1	University of Victoria	82.73	96.63	0.00	0.00	0.00	0.00	-74.00	-74.00	105.36	N/A	9	Travel mishap - loss of data files
23	Amrita Institue of Technology & Science	39.39	8.28	0.00	0.00	0.00	0.00	-14.00	-14.00	33.68	N/A	10	Vehicle stranded in customs
22	Wayne State University	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	11	Withdrew
Electric-Only													
214	Rochester Institute of Technology	100.00	173.07	75.00		150.00	400.00	20.00	20.00	918.07	Yes	1	
219	Princeton University	70.72	180.53	0.00		0.00	0.00	30.00	30.00	281.25	Yes	2	Mechanical drive failure
215	University of Vermont	63.51	181.01	0.00		0.00	0.00	0.00	0.00	244.53	Yes	3	
211	Illinois Institute of Technology	91.44	151.03	0.00		0.00	0.00	0.00	0.00	242.47	No	4	Passed Mechanical
218	Tufts University	88.74	157.52	0.00		0.00	0.00	-41.00	-41.00	205.26	No	5	Passed Mechanical - Motor controller issues
222	Georgia Institue of Technology	70.72	200.00	0.00		0.00	0.00	-80.00	-80.00	190.72	No	6	
216	Boston University	80.18	87.65	0.00		0.00	0.00	0.00	0.00	167.83	N/A	7	Static Events Only
212	Yale University	0.00	0.00	0.00		0.00	0.00	-75.00	-175.00	0.00	N/A	8	Withdrew

(1) Electric Drive entrants are not scored in the Unrestricted Acceleration Event

(2) Applied penalties are limited to the associated event earned score and/or the total competition earned score

Engineering Challenges

Electric 2016 Overall Results

Place	Car Num	Team	Penalty	Cost Score	Presentation Score	Design Score	Acceleration Score	Skid Pad Score	Autocross Score	Endurance Score	Efficiency Score	Total Score
1	230	Czech Technical Univ of Prague	-60	60.2	62.0	145	60.2	50.0	150.0	300.0	100.0	867.4
2	201	Univ of Pennsylvania		90.3	75.0	150	75.0	46.7	95.1	7		539.0
3	203	Polytechnique Montréal		89.9	66.7	120	36.5	39.6	89.2	14		456.0
4	204	McGill Univ	-30	71.0	65.4	140	48.7	36.3	117.4	3		451.7
5	205	Missouri University of Science and Tech		78.0	69.5	70	20.6	22.0	82.0	2		344.1
6	215	Massachusetts Inst of Tech		80.1	61.0	125						266.1
7	213	San Jose State University		63.1	43.2	120						226.2
8	212	California Polytechnic State Univ-SLO		59.1	59.0	90			7.5			215.6
9	220	Univ of Manitoba		61.3	73.1	80						214.4
10	209	Univ of Calif - Davis		73.1	47.2	90						210.3
11	214	Univ of Calif - Irvine		68.5	58.0	60						186.5
12	211	Centro Universitario Da FEI	-50	63.3	62.0	105				2		182.2
13	210	Purdue Univ - W Lafayette		56.6	55.9	60						172.5
14	208	Carnegie Mellon Univ	-40	59.8	58.7	80						158.5
15	216	California Institute of Technology		32.8	54.4	60						147.2
16	217	Georgia Institute of Technology		41.5	34.8	70						146.2
17	229	Univ of Akron		18.7	51.8	60						130.5
18	223	Pakistan Navy Engineering College	-40	83.1	41.5	40						124.6
19	219	Univ of Illinois - Urbana Champaign	-50	60.9	59.3	40						110.2
20	218	Olin College of Engineering	-120	83.6	48.6	90						102.3
21	207	Univ of Michigan - Dearborn	-50	70.6	60.9	20						101.5
	206	Carleton Univ										withdrawn
	221	Portland State Univ										withdrawn
	222	Univ of Waterloo										withdrawn
	224	Univ of Texas - Arlington										withdrawn
	225	Kennesaw State University										withdrawn
	226	Univ of Washington										withdrawn
	228	Yale Univ										withdrawn
	235	Univ of Calif - Santa Cruz										withdrawn

Benefits of Participation

- Real world applications to classroom lessons
- Hands on experience
- Professional development
- Job opportunities
- Electric vehicles are the future
  - In 2016 EV sales jumped 36%
  - 160,000 EV vehicles sold in the US
  - Many automotive manufacturers are developing EV systems
  - Global sales increased 41% , 777,000 vehicles
  - CA wants 1.5 Million Electric cars by 2025

Event Sponsors

- FCA
- Ford
- GM
- LG Chem
- New Hampshire Motor Speedway
- Thayer School of Engineering
- Toyota
- IEEE
- SAE
- Synchronoss
- NER SCCA
- Harman Inspired
- BAE Systems
- Linear Technology
- Mentor Graphics
- Reliable Carriers
- SolidWorks
- Sunoco
- Eaton
- Fibre Glast
- Andy AutoSport

Our Goal

- Develop a multi-disciplinary racing program at FIT that creates a partnership between the SAE, IEEE, and the Sustainability department open to undergraduates and graduate students of all levels.

What do we have?

- A successful FSAE program beginning from 2013 to current with members interested in participating in HFSAE.
- FSAE Alumni Support
- FSAE Materials and race vehicles
- FSAE research and development materials including design journals and logs

What do we need?

- A strong team of dedicated students from IEEE, SAE, and beyond if possible.
  - IEEE: Responsible for Electronics and controls systems
  - SAE: Responsible for chassis and suspension systems in addition to electronics mounting

  NOTE: Crossover work is encouraged for those members who want to experience either responsibility however specialty knowledge is needed for the electronics particularly the requirement for a Electrical Systems Officer, and Electrical Systems Advisor
- Advisor support and assistance
- Funding

  (fully club funded project)
  - Sponsorships
  - School Support