

## **Proposal for YSEA Undergraduate Group Grant - Bulldogs Racing**

Over the past year, the dedicated members of Bulldogs Racing, Yale's Formula SAE/Hybrid race car club have been hard at work building an all-electric race car: BR20. After overcoming one obstacle after another, we are finally approaching the 2020 Formula Hybrid competition, to be held in New Hampshire from April 27-30. The team has spent countless hours designing, building and testing the various complex systems that go into the vehicle, and learnt immensely from the process. Despite being a third of the size of Formula SAE teams from larger universities, we believe our car is capable of holding its own and proudly representing Yale Engineering at this year's competition.

As of February 2020, our chassis, nose cone, body panels and drivetrain have all been designed and built. We overcame our limited electrical engineering expertise to design and test the electrical circuits and motors, and ensured they are in compliance with Formula Hybrid safety regulations. We have also built a new, safer battery box and completed the installation of a new Battery Management System. Working together as a team, we have made significant progress in our preparation for competition.

However, there is still plenty to be done. Our current focus is on: (i) installing the battery box, (ii) completing wire harnessing (iii) integrating all the various subsystems together into a durable and safe car. Once the car is built, we aim to begin an extensive regimen of testing and tuning, running the car through a competition-like course and noting areas in which we can improve. Reliability and durability will be our main focus on the first few rounds of testing, following which we aim to subsequently focus on fine tuning the car. With guidance from [anonymized], our mentor from General Motors, we intend to put in as much effort as possible to put up a strong showing in this year's competition. To accomplish these various goals, including the purchase of various mechanical and electrical components, and to fund travel to competition, we would like to request the support of the YSEA. We are immensely grateful for your financial and technical support over the years, and would love to continue this partnership.

In everything we do, we strive to minimize the risks and dangers our team members might face as well as focusing on our environmental impact. To that end, we are always in very close contact with the EHS and Risk Management to ensure transparent and constructive communication conducive to improving our work environment. Safety regulations are strictly enforced in our garage, including the use of masks, safety goggles and gloves where necessary.

Bulldogs Racing is also committed to extending its reach beyond the garage and into the greater STEM community at Yale. In order to improve member retention, we have renewed our focus on engineering training and team bonding activities. In the past year, we introduced weekly

team dinners and regular movie nights, at which members can get to know one another better. New members of the team receive hands-on training in Computer Aided Design (CAD), machining, the use of garage tools and electronic circuit design. The team also hosted an 'Engine Teardown Workshop' at the Yale Center for Engineering, Innovation and Design (CEID), where we explained the workings of an internal combustion engine. A diverse group of participants from the Yale community attended this event, from petrolheads to newbies. Our members worked hands-on with participants to take apart and put back together a 50cc motorbike internal combustion engine and explained the workings of the machine. We hope that through our efforts, we will be able to inspire the next generation of Yalies to pursue their goals in science and engineering.

As of February 19, Bulldogs Racing is a registered Yale Undergraduate Organization, and we are looking forward to an incredible year of competition and learning.

<b>Itemized Requested Budget</b>					
<b>Item</b>	<b>Category</b>	<b>Quantity</b>	<b>Price per unit</b>	<b>Sales Tax per unit</b>	<b>Total Price (USD)</b>
Programmable Microcontrollers (e.g. BeagleBone Black)	Electrical	3	55.00	3.49	175.48
Electrical components (wires, tapes, connectors etc)	Electrical	60	5.00	0.32	319.05
Dashboard components (Speedometer, Fuel Guage)	Electrical	1	300.00	19.05	319.05
Customizable Printed Circuit Boards (PCBs)	Electrical	10	10.00	0.64	106.35
PCB Components (resistors, capacitors, opamps, mosfets, fuses)	Electrical	50	3.00	0.19	159.53
Accumulator Isolation Relay	Electrical	2	80.00	5.08	170.16
Cooling Tubing	Mechanical	20	2.00	0.13	42.54
Raw Materials for Structural Components (steel, aluminium, wood)	Mechanical	10	15.00	0.95	159.53
<b>Grand Total (USD)</b>					<b>1,451.68</b>
<b>Additional Sources of Funding</b>					
<b>Source</b>	<b>Category</b>	<b>Description</b>	<b>Amount</b>		
Yale School of Engineering and Applied Sciences (SEAS)	General	Competition registration fees, transportation, logistics, accommodation at event, team apparel	9000.00		
Undergraduate Organizations Funding Committee (UOFC)	General	Teaching materials, software, general purpose hardware, team bonding events, team outreach funding	1000.00		
<b>Grand Total (USD)</b>			<b>10000.00</b>		