

Jefferson Science Associates, LLC
Managing and Operating the Thomas Jefferson National Accelerator Facility
for the U.S. Department of Energy

FY2017 JSA Initiatives Fund Proposal Summary Sheet

Proposal title FIRST Robotics teams sponsorship



Total funds requested \$5000

Total leveraged support / Matching funds * See Note below. \$9,500

To be completed by JSA: Total funds awarded \$1,000

Note: Identify in your budget proposal the source, type and amount of support from each institution.

Principal Investigator (PI) David Lawrence

Institutional affiliation Hall-D, Physics Division, Jefferson Lab
Mailing address Cebaf Center A105
Email / phone # davidl@jlab.org / 757-269-5567

Co-PI (if more than 1 add pages with information) Nate Laverdure

Institutional affiliation Cryogenics group, Engineering Division, Jefferson Lab
Mailing address 12000 Jefferson Avenue, Suite 19
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Check one category: If PI is a Lab employee, your identification of the appropriate Associate Director below represents the acknowledgement of that AD with your submittal of proposal. **No signature required.**

Lab employee If Lab employee, Associate director (email / phone) Will Oren: oren@jlab.org x7344 Rolf Ent: ent@jlab.org x7373

Lab user If Lab user, University affiliation. Joint appointees, identify Lab division association.

Other If Other, Institutional affiliation

Executive summary including the projected begin/end dates. **Project Start Date** (mm/yy) 10/2016 **Project End date** (mm/yy) 06/2017
Add additional pages if necessary.

We seek funding to sponsor multiple FIRST robotics teams and events associated with the Jefferson Lab community in the local area. Funding will help support teams participating in FIRST Lego League (FLL, grades 4-8), FIRST Tech Challenge (FTC, grades 7-12), and FIRST Robotics Challenge (FRC, grades 9-12)*. JLab scientists and engineers are directly and significantly involved with these teams and, as coaches and mentors, regularly volunteer their time to help young people discover and develop a passion for science, engineering, technology, and math (STEM). By sponsoring these teams, JSA will support a unified progression of programs designed for students from middle school through high school, ages 11-18. This progression of programs creates a continuous pathway towards a lifetime love of STEM; students advance through increasingly more-challenging competitive long-term technical projects with real requirements and constraints. The path culminates in an international robotics competition where teams win recognition, gain self-confidence, develop people and life skills, make new friends, and perhaps discover an unforeseen career path. These programs complement other K-12 activities of the JLab education outreach by providing many more contact hours between students and JLab scientists and engineers. More than a dozen JLab scientists, engineers, and technicians have been involved with mentoring or coaching a FIRST robotics team. At roughly 50-100 contact hours per season, JLab's participation in the FIRST programs has provided students with hundreds to thousands of contact hours.

It's critical to introduce students to the relevant concepts at an early age for STEM education to have lasting effects. Because eligibility for the sponsored programs begins around age 11, our teams are uniquely positioned to recruit underrepresented groups such as females and minorities by capturing children's inherent curiosity and directing it toward discovering the wonders of science and technology. By working with the students over the course of months, JLab scientists and engineers foster an interest in STEM fields and provide an opportunity to learn how to apply knowledge to solving actual problems in a collaborative environment—a critical skill set for those who will help further the scientific missions of facilities such as JLab.

*see <http://www.usfirst.org/roboticsprograms> for details on progression of FIRST robotics programs

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Synopsis of scientific, educational, technical, and/or business merits, and alignment with and significance to Lab's current program. Add additional pages if necessary.

JSA has a record of recognizing the value of outreach aimed at K-12 students. Getting students interested in STEM topics helps direct them on a career path in a STEM field, strengthening the next generation of talent that JLab and other national labs will need to draw from in the future. More than 10 years of evaluation data indicates that with participation in FIRST programs, team members are twice as likely to major in science or engineering (ref. 1). Almost 90% of FIRST alumni are in a STEM field as a student or a professional. Data also indicates females participating in the FIRST program get a significantly higher boost than their male counterparts when it comes to STEM-related impact (ref. 2.). This suggests that supporting extracurricular activities such as FIRST are important for addressing the gender gap in STEM fields. Minorities are also well represented in the program overall with roughly 30% of participants classified as non-white (ref. 3). Even those who do not choose a career in STEM gain a deeper understanding and appreciation of what is involved in STEM related projects, increasing public support that is critical for science funding.



The Hines Middle School FTC team participated in the 2016 JLab Open House. They demonstrated two robots to the public throughout the day. They were able to talk to people about the skills they developed during the season including mechanical design, electrical, and computer programming. (Not to mention the serious problem solving done in the process!)

1. http://www.usfirst.org/sites/default/files/uploadedFiles/About_Us/Media_Center/FIRST_Facts_Assets/FIRST_impact_stats.pdf
2. http://www.usfirst.org/sites/default/files/uploadedFiles/Who/Impact/Brandeis_Studies/FIRST-Longitudinal-Study-Summary-of-Preliminary-Findings-Year-2.pdf
3. http://www.usfirst.org/uploadedFiles/Who/Impact/Brandeis_Studies/FTC-FRC_Cross_Program_Evaluation_Executive_Summary_2011.pdf

Proposed evaluation plan to measure success. If this is a request for renewal of funds, assessment of prior year performance. Add additional pages if necessary.

Success will be measured by the number of direct contact hours between program participants and the JLab scientists and engineers that serve as mentors to the teams. For example, coaching the FLL team has resulted in approximately 40-50 contact hours with the 10-12 team members over the course of 2 months. Team participation in competitions is also an important indicator of the success of the programs. To a lesser extent, team performance and awards received at the competitions can be seen as indicators of the quality of the individual team programs. Below is a list of awards received by teams sponsored by JSA IF grants in the past.

Team: Hines Middle School Spegonauts FLL
Coach/Mentor: David Lawrence

2016 Crittenden qualifier (participation)
2015 CNU Community STEM Day Judges Award
2014 CNU Community STEM Day Robot Design Award
2013 Judges Award
2012 First place Robot Performance, Second place Champion's Award
First place Robot Performance VA/DC Regional Championship
2011 First place Robot Performance

Team: Hines Middle School Spegonauts FTC
Coach/Mentor: David Lawrence

2016 Virginia FTC Eastern Qualifier Tournament, Richmond (participation)
2016 Virginia FTC Eastern Qualifier Tournament, NSU (participation)
2013 Virginia FTC Central Qualifier Tournament, Richmond Judge's Award
2013 Virginia FTC Eastern Qualifier Tournament, NSU (participation)

Team Electrical Invaders FTC
Coach/Mentor: Brandy Bergenstock

2016 Virginia FTC Eastern Qualifier Tournament, Richmond (participation)
2016 Virginia FTC Eastern Qualifier Tournament, NSU (participation)

Your proposal may include letters of endorsement and other supporting information. A maximum of 10 additional pages may be appended to this proposal form.

Budget Proposal

Proposal Title FIRST Robotics teams sponsorship

Principal Investigator (PI) David Lawrence

Total funds requested \$5000

To be completed by JSA: Total funds awarded \$1,000

	Item Description		Amount
Equipment. Lab users submitting proposals that include equipment to be used at the Lab must review with the appropriate Lab Associate Director. The provision of the name of the AD below represents the AD's acknowledgement. No signature required.			
	Associate Director: _____	_____	
	_____	_____	
	_____	_____	
		Subtotal Equipment	0
Travel Support. Provide break-out of estimates for registration fees, lodging and transportation, catering, and facility charges (room rentals, AV equipment; etc.)			
	_____	_____	
	_____	_____	
	_____	_____	
		Subtotal Travel	0
Supplies	FLL (field setup kit + EV3 robot kits)	\$980	
	FTC (kit of parts, misc. motors, controllers, raw materials for robot construction)	\$1500	
	FRC (field setup equipment, office supplies, awards, misc. event related supplies)	\$1745	
		Subtotal Supplies	\$4225
Consultants/Subcontracts			
	_____	_____	
	_____	_____	
		Subtotal Consultants/Subcontracts	0
Other Expenses. Examples include stipends and honoraria, prizes, awards. The JSA Initiatives Fund Program does not support salaries and salary-related expenses, or indirect expenses. Describe other expenses below.			
	FLL Registration	\$225	
	FTC Registration	\$550	
	_____	_____	
		Subtotal Other Expenses	\$775
		Total Budget Proposal	\$5000

Budget Justification and Leveraged Support/Matching Funds information. Identify the source, type and amount of support from each institution. For in-kind support, provide estimate of value. Your identification of the authorized representative who has committed institutional support for your proposal represents the acknowledgement of that individual. If support or funds are provided by the Lab, identify the associate director (or equivalent) as the authorized representative. Add additional pages if necessary.

Budget Justification

In the following table, we summarize the annual operating costs per team for each of the FIRST teams associated with JLab. These annual operating costs are based on previous years' actual expenses.

As the complexity of competition increases through the progression of FIRST programs, the costs increase as well. These costs are offset by the efforts of students, parents, mentors, and teachers to raise the funds necessary to compete. At the higher levels of competition, successful and self-sustaining teams use their resources to seek additional sources of matching funding. Reflecting this concept, we propose to support each of these programs in a tiered progression of sponsorships that makes a greater relative contribution to the annual operating costs of the younger teams.

Program	Number of teams associated with JLab	Annual operating cost per team	JSA IF requested funds per team	JSA IF contribution of requested funds towards annual operating cost
FLL	1	\$2,010*	\$1,205*	60%*
FTC	2	\$3,035	\$1025	34%
FRC	1	More than \$35,000	\$0	0%

** The FLL team is looking to replace the aging NXT2 robot kits, (now more than 6 years old) with new EV3 kits. Thus, costs will be higher this year if we're able to obtain this level of funding.*

In the case of FRC, we propose not to support an individual team, but instead to sponsor a local off-season FRC competition, the Rumble in the Roads. This proposal positions JLab as a significant contributor to the growth and sustainability of approximately 30 FRC teams from VA, MD, NC, and DC. Community-led events like the Rumble in the Roads give students the opportunity for year-round engagement and exposure to unique engineering learning opportunities. In addition, team members have the chance to further develop the skills that will serve them as STEM professionals. The funds requested in this proposal will help defray the costs associated the equipment, logistics, transportation support, and technical expertise needed to host a high-quality off-season FRC competition, the only event of its kind in Hampton Roads.

Event	Operating cost	JSA IF requested funds	JSA IF contribution of requested funds towards annual operating cost
FRC off-season competition	\$9,500	\$1,745	17%

Leveraged Support / Matching Funds

CH2MHill

\$3,950 (from 2011, 2012, 2013, 2014, 2016 seasons)

Doug Bitterman

Doug.Bitterman@ch2m.com / 757-671-3291

SAIC

\$1,545 (2015-2016 season)

Heather Earhart

HEATHER.M.EARHART@saic.com

Rockwell Collins

\$1,270 (2015-2016 season)

Carol Edelman

mailto:cedelman@virginiafirst.org

Anthem

\$500 (anticipated)

Stacey Bueter

Stacey.Bueter@anthem.com

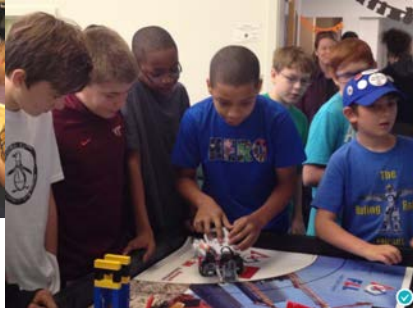
Rumble in the Roads 2015

- Christopher Newport University, \$500 (POC Dr. Anton Riedl, Chair of the Department of Physics, Computer Science and Engineering)
- Q-Free Open Roads, \$200 (POC Mr. Bruce Kenney, Vice President of Intelligent Transportation Systems Division)
- InSource Solutions, \$500 (POC Mr. Aaron Evans, Vice President)
- Canon, \$500 (POC Ms. Carlina Neely, Human Resources Specialist)
- Newport News Shipbuilding – Huntington Ingalls Industries, \$500 (POC Mr. Ray Montgomery, Director of Engineering)

Rumble in the Roads 2016 (expected)

- Christopher Newport University, \$500
- InSource, \$500
- Canon, \$500
- Newport News Shipbuilding – Huntington Ingalls Industries, \$500
- Q-Free Open Roads, \$200

(Some funding is in the form of equipment carried over from previous years)



HMS Lego Robotics team. Center picture taken at pre-tournament event organized by Electrical Invaders



FTC team Electrical Invaders with coach Brandy



HMS FTC Robotics team with Dr. Dave



Pictures from FRC Rumble in the Roads event organized by FRC team Triple Helix and coach Nate

