Pacific Library Partnership
Innovation and Technology Opportunity Grant Program

Due Friday, October 10, 2014

Please provide the following information in a Microsoft Word document. Please email the completed form to Wendy Cao at caow@plsinfo.org.

1. Title of Project Livermore Public Library Robotics Camp

2. Library/Committee applying for funding Livermore Public Library
   Name Nathan Brumley
   Email njbrumley@livermore.lib.ca.us
   Mailing Address 1188 South Livermore Avenue, Livermore, CA 94550

3. Amount of funding requested $14,945

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PLP Innovation and Technology Opportunity Grant Program

1. One paragraph project summary.

The Livermore Public Library proposes to host an interactive robotics summer camp for local tweens and teens (ages 10-14), which will help develop practical engineering skills and unleash creativity through hands-on experimentation. Over 10 weeks, 10 pairs of participants will develop applied skills as they design, build, and program Hummingbird robotics kits in a collaborative environment with an adult instructor. They will also learn to be visual thinkers as they tap into their artistic sides creating parts/accessories for their robots using crafting materials. The robotics camp will foster a culture of tinkering – if you can think it, you can make it. It will also help to fulfill STEAM (STEM + Art) educational initiatives. At the end of the camp, students will participate in a Robot Roundup showcase where the students will have the opportunity to show off their work. Coinciding with the camp, the library will have six pre-constructed robots available for checkout to provide inspiration and allow further exploration and learning at home.

2. Explain how this project fits with the library's strategic directions.

The Livermore Public Library encourages the development of a lifelong interest in reading and learning by youth and adults, provides materials and services of popular interest, supports the educational needs of the community, furnishes timely, accurate information, and builds cultural awareness and enrichment.

The library's current strategic objectives include increasing services to underserved groups in the community. In this case, the library aspires to improve programs and services to the tween and early teen populations, a segment of the library population that often gets overlooked. This age group is at a critical stage in developing lifelong skills. Our community needs assessment for 10-14 year-olds emphasize a need to provide more STEAM programs. The library wants to help broaden horizons for Livermore tweens and teens by preparing them to competitively be involved in accessing future tech and engineering employment opportunities in their community.

Additionally, this project fulfills the following Strategy Areas from the Livermore Public Library's 2014-2019 Strategic Services Plan:

Community Partnerships – To generate community interest and to recruit participants, volunteers, and an instructor, the library will reach out to Livermore organizations including: local schools, national science laboratories in the area, and i-GATE, an innovation hub in the Tri-Valley region which specializes in growing technology startups. This will encourage community members to be more involved in library services and activities. In turn, it can create more visibility for i-GATE.

Programming – A robotics camp is a new unique program idea designed to appeal to Livermore tweens and teens, an age range the library wants to provide more services to. It will encourage sought-after programming technology skills and creative artistic design skills. In partnering with local science and tech organizations, a level of expertise will be brought to the program making it more desirable.

Technology – This program is a great way for young residents to access new technology and explore a skillset that is rapidly growing in importance in the job market. Pre-constructed robots will be available for library card holders to check out, which can be used to explore programming and robotics.

"The vast majority of respondents to the 2014 Future of the Internet canvassing anticipate that robotics and artificial intelligence will permeate wide segments of daily life by 2025, with huge implications for a range of industries such as health care, transport and logistics, customer service, and home maintenance." An article from PEW about AI and robotics and the changing landscape of the country's workforce states. It's clear that computers and robotics will continue to play a huge role in the near future and engaging tween's interest in this area with fun programs and opportunities that the library provides can be a make a significant impact on career aspirations. (http://www.pewinternet.org/files/2014/08/Future-of-AI-Robotics-and-Jobs.pdf)

3. A description of the proposed project including the population served and the demographics of that population.

This interactive STEAM project will provide a fun hands-on introduction to beginner programming and will feature structured sessions and optional drop-in sessions for self-guided learning, with volunteers available to help. There will also be an option of open exploration at home by checking out pre-constructed robots. Tweens and teens ages 10 to 14 will be invited to apply to take part in a 10-week summer Robotics Camp at the Livermore Public Library. As part of the application process, applicants will include a brief essay on why they are interested in joining the Robotics Camp along with a commitment form, stating their agreement to be present for each class.

Thirteen (13) Hummingbird Arduino Kits will be purchased for the camp. There will be 10 kits available for the 10 teams, 2 people per kit. The remaining 3 kits will act as backup for parts. The 10 teams will each be given a laptop computer to perform computer programming functions. The computers will be available during camp sessions. Possible programming languages to be learned include: CMU CREATE Lab Visual Programmer, Scratch, SNAP!, Python, Processing, Java, and Calico.

During the camp, 20 chosen students will pair up and collaboratively design and construct a robot over 9 weeks. They will be taught the basics of coding from a paid adult instructor who will guide them throughout. At the end of the camp on the 10th week, teams will show off their robotic constructions at a Robot Roundup event. Each of the 10 teams will have one Hummingbird robotics kit so participants can specialize in programming, construction, and wiring. Each team will have access to a laptop computer for programming and controlling their robot. The instructor will be present to provide assistance should participants need it. The library will also provide an optional drop-in session once a week staffed by a volunteer in case teams missed a session or need additional assistance with their Hummingbird kits.

Camp participants (and eventually other library patrons) will be able to check out pre-constructed robots from the first day of class to take home in order to continue practicing and explore coding on their own.

Students will gain experience working with mechanical engineering and mathematical concepts such as estimation, and learn to calculate distance, time and speed. They will learn to work as a team in order to complete projects.

The target age groups, tweens and teens, make up a significant portion of the community. Census data shows that the Livermore Population Ages 5 to 17 years was 18.9%, or 15,276 of the total population in 2010.
(http://www.bayareacensus.ca.gov/cities/Livermore.htm)

While students in the Livermore Valley Joint Unified District are meeting their Academic Performance Index and Graduation Rate goals each year, they did not adequately meet their English-Language Arts and Mathematics goals for the years 2012 and 2013. Science in particular has been identified as a major subject in need of additional support by community leaders. (2012-13 Accountability Progress Reporting - http://data1.cde.ca.gov/dataquest/Acnt2013/2013APRDstPIReport.aspx?cYear=&allCds=0161200&cChoice=PI12b)

4. The goals and objectives of the project.

The Robotics Camp will encourage technology literacy through computer science exploration and programming coupled with artistic discovery for local underserved youths ages 10-14. Camp participants will also be able to borrow related library books/videos to supplement their learning at home.

This fun and engaging program is a great starting place for youth in the community to learn about computer science. This knowledge could then be extended by making use of other community resources, like the Robot Garden, a Makerspace located at i-GATE Innovation Hub, if participants want to take their learning to the next level. The Livermore Public Library will explore partnership opportunities with the i-GATE Robot Garden in order to facilitate this process.

Goal 1: Empower underserved Livermore tweens and early teens with technology literacy/fluency by introducing them to computer programming and its practical application in the form of robotic technologies.

Objectives: Livermore Public Library will contract with a computer engineering specialist to run the youth robotics camp. An instructor with an engaging personality and thorough skills will be selected to oversee the robotics camp and teach youth how to manipulate technology for their purposes.

Goal 2: Inspire tweens and early teens to be innovative through interactive education in order to complete a project. To create a project that not only supports STEM learning, but encourages a blending of creative and artistic thinking. We want this to be a fully integrated STEAM learning opportunity.

Objectives: The robotics camp is designed to inspire participants to think creatively. They will develop perseverance in planning, implementing, testing, and revising their robots from design concept to finished programmed product to be showcased at the final event, the Robot Roundup.

Goal 3: Facilitate an ongoing interest in robotic technology for self-exploration at home.

Objective: The library will provide additional patrons the opportunity to discover robotic programming and technology by allowing checkout of pre-constructed robots.

Goal 4: Partner with nearby scientific community organizations to tap into local expertise. Develop a collection of library materials in the subject area of robotics technology and programming.

Objective: Garner at least one volunteer from each of the local laboratories, Lawrence Livermore National Laboratory or Sandia National Laboratory to provide camp participants optional drop-in help. Collaborate with volunteer on reliable collection development.

5. The project timeline (activities).

Time Period	Action	Person Responsible
December 2014	• Order Hummingbird Kits, extra parts, and pre-constructed robots.	Project Lead
January 2015	• Look for paid instructor to lead program instruction. • Open recruiting for volunteer adult coaches begins.	Project Lead
February 2015	• Reach out to local laboratories and i-GATE to invite involvement in program. • Create contract for program instructor.	Project Lead
March 2015	• Deadline for hiring paid instructor. • Compile list of volunteer adult coaches. • Go through Hummingbird Kits and verify all parts are working.	Project Lead Program Instructor
April 2015	• Design marketing for program and begin pushing it out. • Outreach to schools for recruiting applicants. • Begin accepting applications from students.	Project Lead
May 2015	• Order art supplies and construction materials • Review instructor's syllabus for the duration of the program. • Select 20 students from applicants and notify them. • Have all students sign agreement form to be present at all instructor-led classes.	Project Lead Program Instructor
June 2015	• Send out course schedule to participants. • Classes and open sessions begin. • Initial technology comfort surveys administered.	Project Lead Program Instructor
July 2015	• Classes and open sessions continue. • Begin marketing Robot Roundup.	Project Lead Program Instructor
August 2015	• Final classes and open sessions. • Final technology comfort surveys administered. • Robot Roundup closing event.	Project Lead Program Instructor

6. The evaluation of the project.

The project will collect both qualitative and quantitative data to identify program strengths and weaknesses. The key mission of the robotics camp is to engage and inspire tweens and teens to apply technology in a fun collaborative learning environment. In addition to learning computer

coding and programming, tweens and teens will learn to work interactively and to see a project through from start to finish. Additionally, they will develop applied skills practical for a technology-oriented workforce.

Project evaluation will be based primarily on survey feedback from participants, outcome of project completion rate, and whether the camp actively engaged 20 tweens with programming in a way that sparks creativity. Rich data will be collected from participants about their experience in the camp and their progress towards meeting learning goals. Surveys will be administered: one prior to the camp's start and another at the completion of the camp, to gauge levels of interest, experience, career aspirations, satisfaction, and how likely they would be to do these kinds of activities after the class with friends. Weekly attendance will be monitored to ensure participation continues throughout the program.

Count use data of resources and attendance will also be tracked. Circulation statistics from the borrowable pre-assembled robots will be collected. It is intended that the Thymio II and Wonder Workshop Dash robots will circulate so that 60% or more of their inventory is completely checked out each week. Headcount statistics will be also counted from the Robot Roundup, with hopes that a minimum of 100 individuals will attend.

7. The project budget.

Item	# of Units	Price per Unit (+ tax, shipping)	Funding Agency	
			In Kind Cost	PLP Cost
Laptop Computers	10	$552		$5,520
Hummingbird (Arduino) Kits	10	$225		$2,250
Backup Hummingbird Kits	3	$225		$675
Pre-Assembled Robots (Thymio II and Wonder Workshop Dash)	6	$200		$1200
Backup Parts, Lights, Sensors	30	$10		$300
Instructor	1	$1,500		$1,500
Crafting Equipment/Supplies (One set per team of pliable metal, cardboard, paints, etc.)	10	$100		$1,000
Staff Training / Development	1	$300	$300	
Promotional Pieces	25	$10	$250	
Promo Pieces Design Time (Librarian)	2 hours	$30	$60	
Camp Participant Selection Time (Librarian)	5 hours	$30	$150	
Volunteer Training Time (Librarian)	2 hours	$30	$60	
Camp Room Setup/Teardown Time (Technology Assistant)	30 hours	$15	$450	
Project Lead Time (Librarian)	65 hours	$30	$1950	
Library Collection Materials	60	$50	$500	$2,500
			Total: $3,720	**Total: $14,945**