Pioneers in Engineering

Annual Report 2014–2015

Berkeley: where the #1 public university in the world is next to some of the most under-served public schools in the nation. UC Berkeley's College of Engineering is among the finest in the nation, but for students in surrounding communities, there are high barriers to exploring and pursuing STEM (Science, Technology, Engineering and Math) careers.

Pioneers in Engineering (PiE) is a UC Berkeley 501(c)(3) student organization that combines public service and engineering projects to address this disparity. Our mission is to create engaging STEM experiences for East Bay students that provide them with the tools, resources, guidance and inspiration to build their own future.

We build to inspire.

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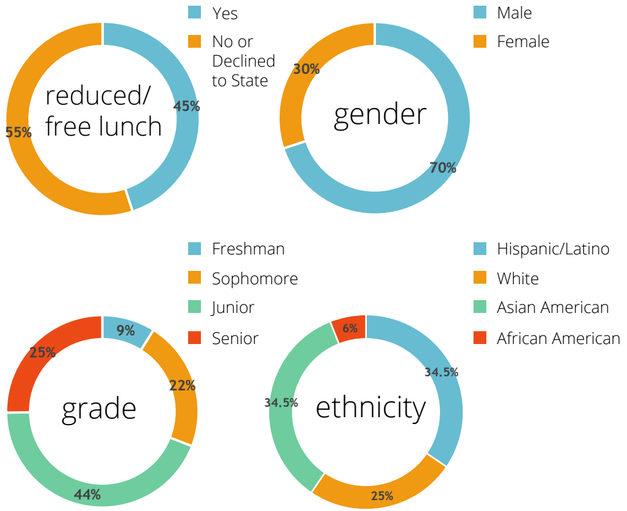
SHOWING SPIRIT| Although they were eliminated early on in the competition, REALM students went right back out to inspire kids by letting them drive around their boldly decorated robot. This great attitude won REALM the Texas Instruments Spirit Award.

student demographics



Year 7

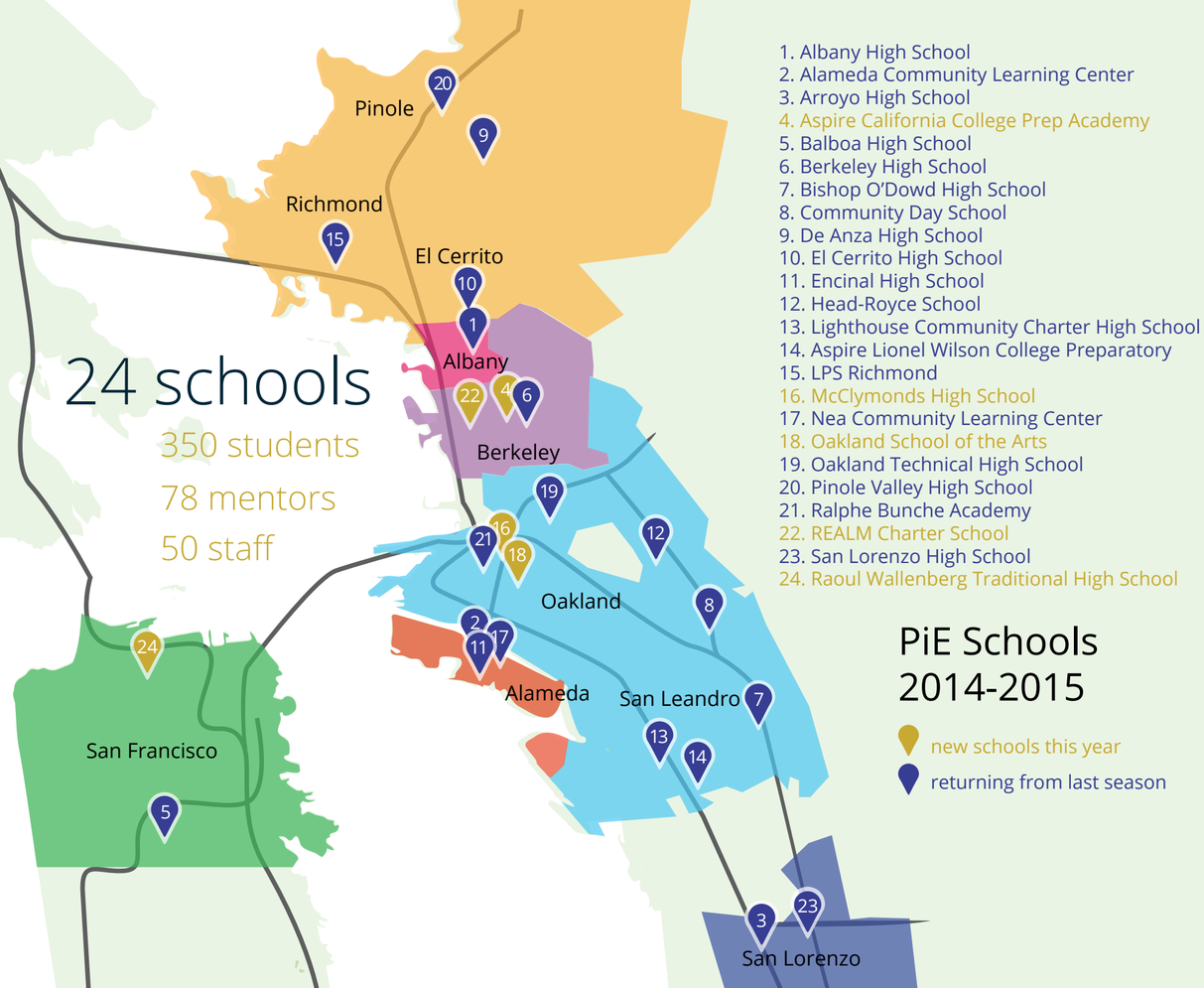
Seven years ago, PiE started with four founding members and served six schools. Since then, we have expanded to four times that amount with over 350 students participating in our events. This year, PiE's goal was not only growth, but also providing students with a more sophisticated and challenging STEM experience.

In this report, you will read about what we have accomplished: our staff built a hovercraft as part of our PREP Program (Pg. 7); revamped the robotics kit provided to students for our annual competition (Pg. 8); and engineered a fully autonomous field (Pg. 10). We are pleased to share these achievements with you, as well as our initiatives for the next year.

59%
of schools are Title 1

1 to 5
mentor to student ratio

over 1,120
hours of mentoring



24 schools
350 students
78 mentors
50 staff

1. Albany High School
2. Alameda Community Learning Center
3. Arroyo High School
4. Aspire California College Prep Academy
5. Balboa High School
6. Berkeley High School
7. Bishop O'Dowd High School
8. Community Day School
9. De Anza High School
10. El Cerrito High School
11. Encinal High School
12. Head-Royce School
13. Lighthouse Community Charter High School
14. Aspire Lionel Wilson College Preparatory
15. LPS Richmond
16. McClymonds High School
17. Nea Community Learning Center
18. Oakland School of the Arts
19. Oakland Technical High School
20. Pinole Valley High School
21. Ralphe Bunche Academy
22. REALM Charter School
23. San Lorenzo High School
24. Raoul Wallenberg Traditional High School

PiE Schools 2014-2015

new schools this year
returning from last season

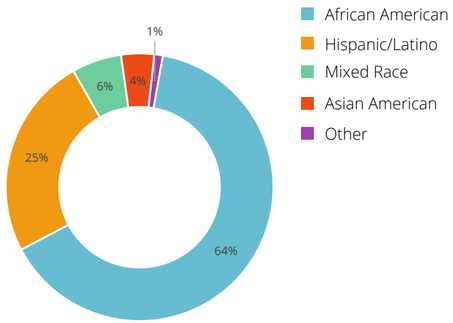
Prep

The Prep Program is a semester-long 2-unit field work class led by a team of PiE staff members. This year, mentors introduced STEM concepts with activities like Snap Circuits, Mindstorm Tug-of-War, Mindstorm Maze Challenge, and Hovercraft.

> "My students have very limited access to STEM outside of school. The school is under resourced and serves an at risk community. This is one of the few hands-on science extracurricular programs that the students will ever be exposed to."
>
> Dr. Adam Siegel
> Ralph Bunche High School

Student Demographics

Prep partnered with two alternative education schools located in the Oakland Unified School District (OUSD): Community Day and Ralphe Bunche.



Staff members designed and built two fields, one for each school, to use in the the Mindstorm programming challenge.

Mindstorm Maze Challenge

We debuted a new project, the leaf-blower hovercraft, during the Prep field trip to Cal (see facing page). The students from Community Day were so excited about it that they ended up building their own hovercraft at school with PiE mentors.

Field Trip and Hovercraft

Robotics Competition

Our goal is to create a fun and challenging 8-week competition that gets students excited and more confident about pursuing STEM fields. This year marked the first RC in which students were provided with an off-the-shelf robotics system.

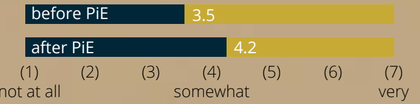
Students, especially first-time participants, liked the kit's reliability, quick code deployment, and pre-drilled parts, which facilitated prototyping. However, some students felt that the kit's size and parts constrained their design choices.

Based on this feedback, we intend to move to a hybrid base kit, to capitalize on the benefits of off-the-shelf products and the design flexibility of in-house parts.

CHAMPIONS | The winning alliance this year was Albany High School and Head Royce. Albany also won two more awards, for engineering professionalism and their engineering journal.

62% self-reported feeling more comfortable with mechanical skills. On average:

46% self-reported feeling more comfortable with programming skills. On average:

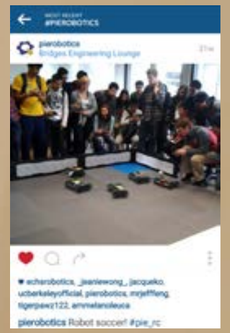


#pierobotics snapshots

Kickoff

We introduce a soccer mini-game at Kickoff. Teams use their base kits to compete.

100% of teams left Kickoff with a working robot, compared to around 80% in previous years



Game Day

Teams learn the game, Fast Food Frenzy, by playing another mini-game: COMPact.

Design Reviews

Students get their designs reviewed by industry, UC Berkeley faculty, and PiE staff.

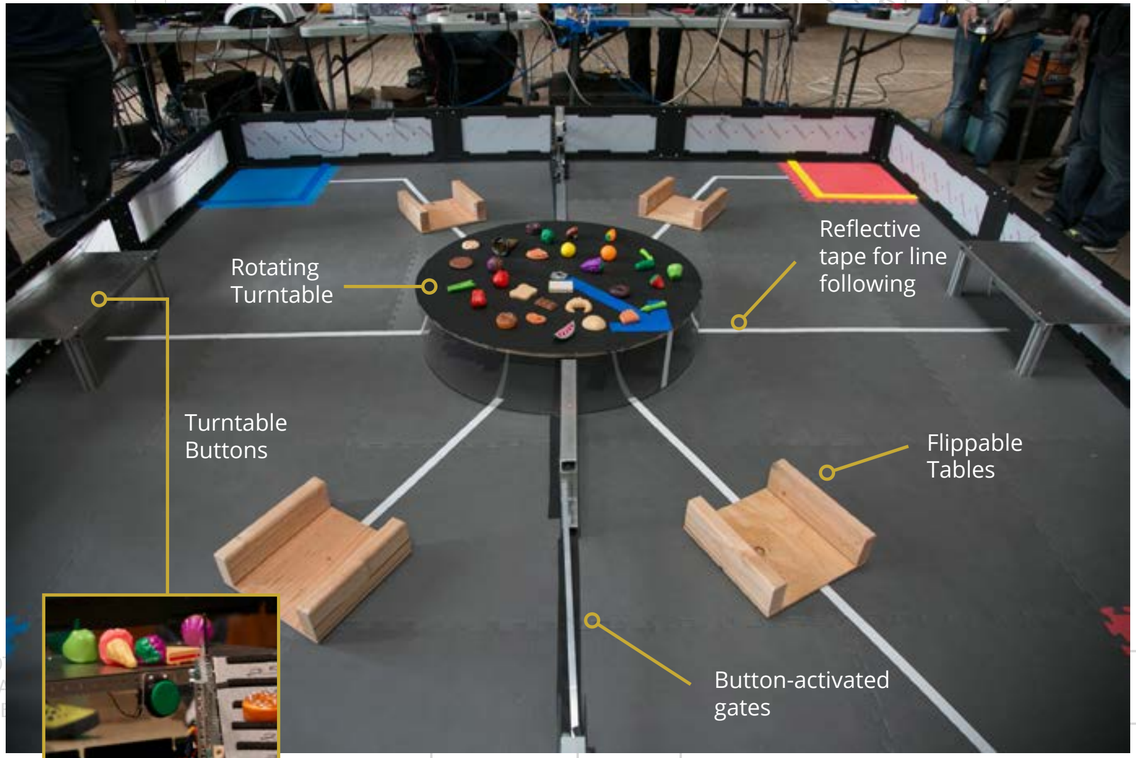
Scrimmage

Teams test their robots and strategies out in practice matches against each other.

Final Competition

"My favorite moment was final competition! It was awesome! Very intense!"

Automated Field



PiE Alumni Scholarship

Meet Pedro Becerra, the winner of our second annual PiE Alumni Scholarship.

Pedro passed through several high schools in the OUSD before arriving and excelling at Community Day, where he participated in two seasons of the PiE Robotics Competition. Despite his rocky start, Pedro has grown to be quite the energetic and inspirational participant. Pedro showed us how the right opportunities and environment can empower students to achieve great success.

One of his teachers summed him up perfectly: "The Pedro you'll meet today is still gentle and sweet, but he has found his voice and is a leader amongst his peers."

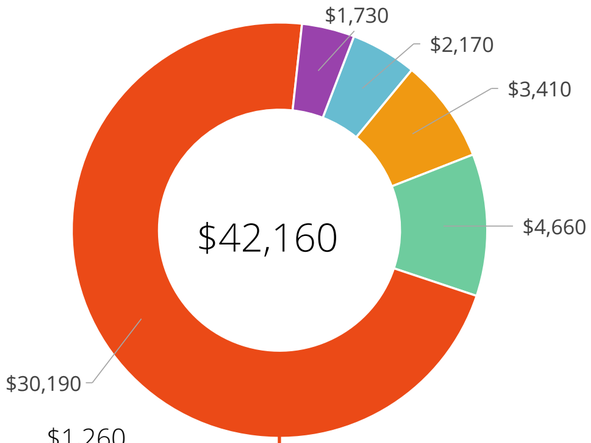
We hope that our $1,500 scholarship will help support him as he starts a new chapter in his educational career at Chabot Community College!

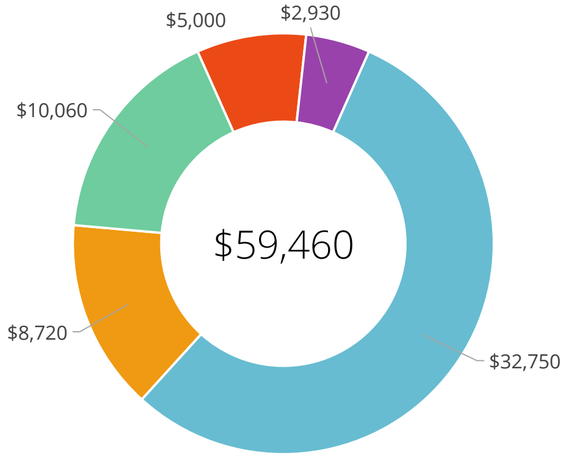
About the Scholarship

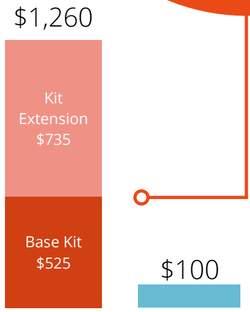
The PiE Alumni Scholarship is our way of directly supporting students as they move into higher education. Any high school student who has participated in at least one of PiE's programs is eligible to apply. The application process begins with an online application, and ends with an interview with PiE alumni at the PiE RC Final Competition.

Pictured alongside Pedro are three members of the scholarship committee, from left to right: Vanathi Ganesh, Frank Chuang and Peter Nakamoto.

Financials







Expenses

- RC: Kit and Kit Extension
- RC: Kit Development
- RC: Events
- Prep Program
- Organizational

Income

- Corporate Sponsorship
- Volunteer Hour Matching
- UC Berkeley Departmental Allocations
- Grants and Awards
- Earned and Other Income

*rounded up slightly, from $1,257.91

Donors

PiE's program is not possible without generous donations from our sponsors. Our biggest donors from Year 7 were:

$10,000-$25,000

SanDisk: $15,000
Texas Instruments: $10,250

$5,000 - $9,999

Qualcomm Foundation: $7,500
Robert Luan (Microsoft Volunteer Hour Matching): $6,112
UC Berkeley College of Engineering: $6,000
Yahoo Employee Foundation Spark Grant: $5,000

$1,000 - $4,999

UC Berkeley ME Department: $3,250
UC Berkeley Engineering Student Council: $3,083
Ryan Julian (Google Volunteer Hour Matching): $2,360
Vanathi Ganesh (Qualcomm Volunteer Hour Matching): $1,650
UC Berkeley EECS Department: $1,000

All donations to PiE are tax-deductible.

How many kits?

The average cost per kit is $1,260. To put our top donors' gifts in context:

= one kit

12 SanDisk

8 Texas Instruments

6 Qualcomm

Looking Ahead

In 2014–15, Pioneers in Engineering brought hands-on STEM experiences to 24 local high schools through the Prep Program and spring Robotics Competition. In the following year, we aim to engage our students with a new event: Fall Competition. It is an opportunity for high school students to engage in robotics and STEM year-round and for new PiE staff to get a taste of RC.

Our other goal for the 2015–16 year is to share our organization's story with other college campuses around California. PiE will be starting these conversations — specifically with UC Merced and UC Davis — to help students at other universities explore how to a model like PiE may impact both the campus and the community around them.

We are very excited for what the future will bring!

Tomoya Ogura
Director 2015-2016
director@pioneers.berkeley.edu

Join Us

There are many ways to support PiE in its future goals. Skill-based volunteering, judging at events, donations and gifts in kind (tax deductible), and even starting a scholarship are all possible ways to help.

Contact partnerships@pioneers.berkeley.edu to find out more.

Acknowledgments

PiE is made possible through a large amount of outside assistance. While there are many who have helped us, we would like to recognize these key individuals who have provided unique and unwavering support.

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George Anwar
Lecturer, Department of Mechanical Engineering, UC Berkeley
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Director, Engineering Student Services, UC Berkeley
Shankar Sastry
Dean, College of Engineering, UC Berkeley
Professor Tsu-Jae King Liu
EE Divison and Chair and Department Chair, Department of EECS, UC Berkeley
Eric Fraser
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Sue Guevara
Visitor Programs Manager, Lawrence Hall of Science
Emma Duran-Forbes
Special Events Coordinators, Lawrence Hall of Science
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