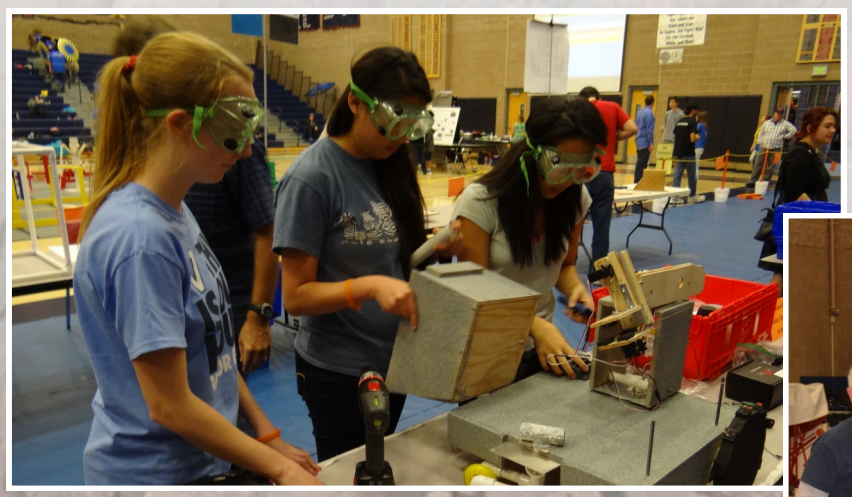
FRONT RANGE BEST

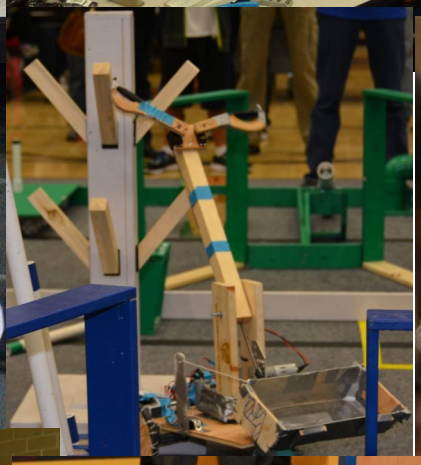
2015 Annual Report

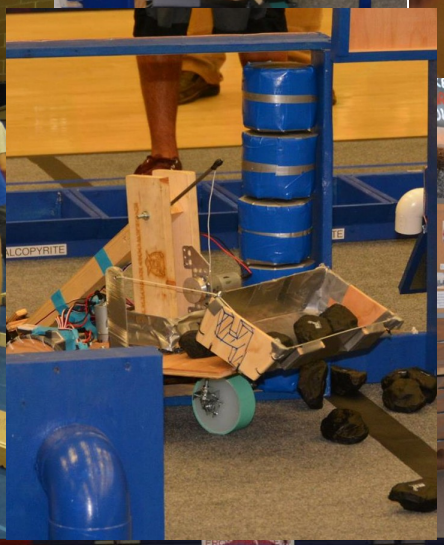


PAY DIRT

Boosting Engineering, Science, and Technology




STEM
BEST

Our Mission Statement

To host an engaging robotic competition which will excite and inspire Colorado students to pursue careers in science, technology, engineering and math while developing career skills for tomorrow's technical leaders.

Our Core Values

- Students are the sole participants and primary decision makers, designers and builders.
- Any student may participate.
- The program is Free to schools - no entry fee.
- Equipment and materials are provided to teams at no cost.
- Any school may participate, regardless of type, size, location or socio-economic status.

Our Goals

- To become a premier robotics competition for the Front Range Region.
- To build strong community-based support for our activities.
- To form alliances with organizations who serve youth locally and deliver the BEST product possible to schools and their students.
- To motivate students for studies and careers in engineering, science, and technology.

Our Objectives

- Prepare students to be technologically literate and thus better prepared to enter the workforce.
- Help Students develop leadership, project management, teamwork and organizational skills.
- Develop students' confidence and competence through self-directed learning, decision-making, abstract thinking and problem-solving.

The BEST Concept

BEST (Boosting Engineering, Science and Technology) is a program designed to engage, excite and inspire youth to become involved in engineering, science and technology through a sports-like contest in which local middle and high school students design and build a remote-controlled robot. Each year the game is revealed at Kick Off in mid-September and the teams create a robot which plays that year's game. Education and industry professionals volunteer as mentors, providing professional expertise in the design and construction processes and the teamwork required to be successful in today's businesses. To simulate a "real world" business and engineering environment, some restrictions include:

- Short development time (six weeks)
- Limited components (identical materials provided)
- Specific design requirements (size, weight, etc.)

BEST originated in 1993 when Ted Mahler and Steve Marum, two engineers with Texas Instruments in Sherman, Texas, started the program as a competition for rural schools in the area. The first competition hosted 14 schools and 221 students. In fall 2012, over 875 schools and 18,000 students participated.

Front Range BEST (FRBEST) is an all-volunteer nonprofit (501(c)3) organization which held its inaugural BEST competition in 2015. It draws primarily from three Colorado counties Arapahoe, Douglas, and Jefferson counties. Together, these counties account for over 268,000 students across 9 school districts.

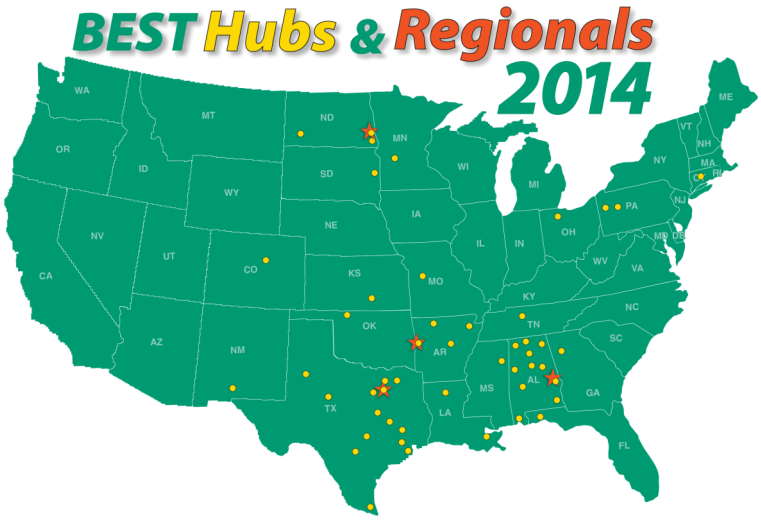
FRBEST is one of many local "hubs" that hosts the BEST competition. A typical hub supports anywhere from 12 to 30 teams relying on local volunteers and donors. The hub plans events and coordinates with the schools, volunteers, and venues.

The local hub provides two kits of materials to the schools. The consumable kit consists of materials that are cut and modified for robot construction. The return kit is consists of the electronic components which are given back to the hub for refurbishment and reuse. This approach reduces operating costs and allows the hubs to provide the competition free to the schools.

There are additional operating needs and costs including the game field, venues, logistics, refurbishment, and consumable kits. Each hub develops strategic partnerships and performs fundraising efforts. In addition, hub recruit and coordinate the many volunteers needed judging and event logistics.

Front Range BEST Board of Directors

President	Joel Kirkland
Vice President	Tami Kirkland
Secretary	Donna Gerlich
Treasurer	Phil Hardy
Board Member	Nikki Baird
Board Member	Stefanie Mann



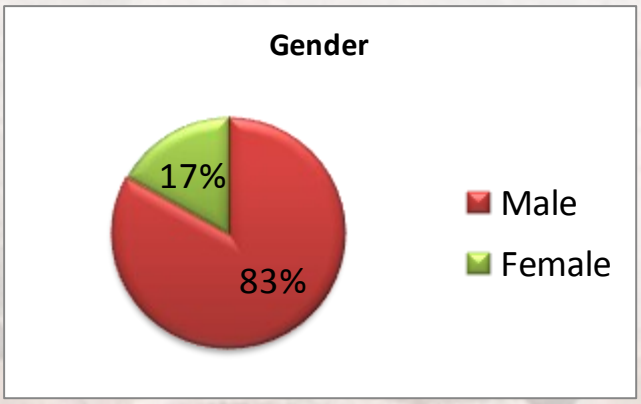
Demographics

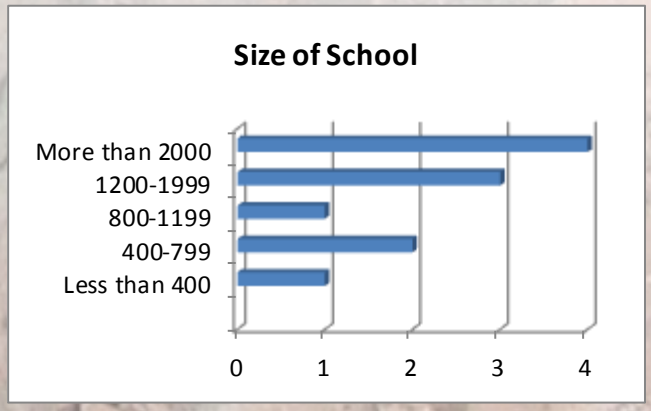
12 Teams

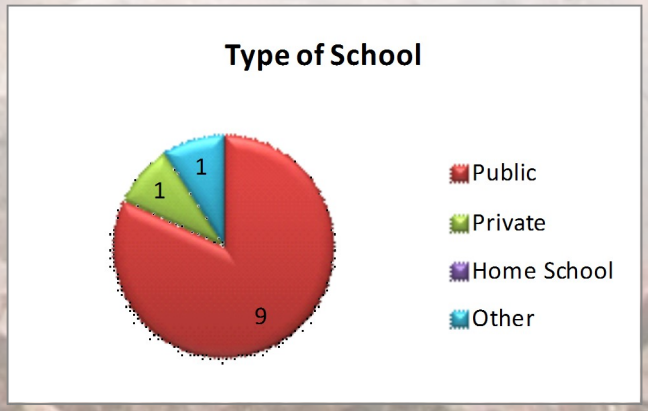
184 Students

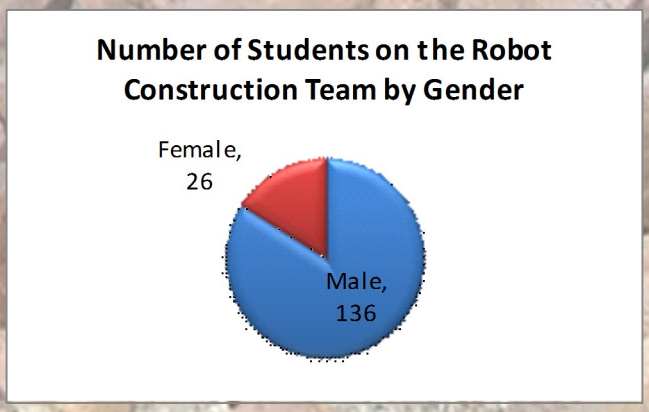
23 Teacher/Mentors

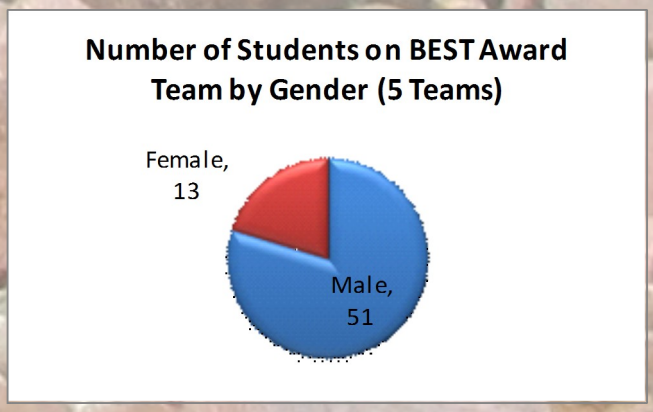
60+ Volunteers

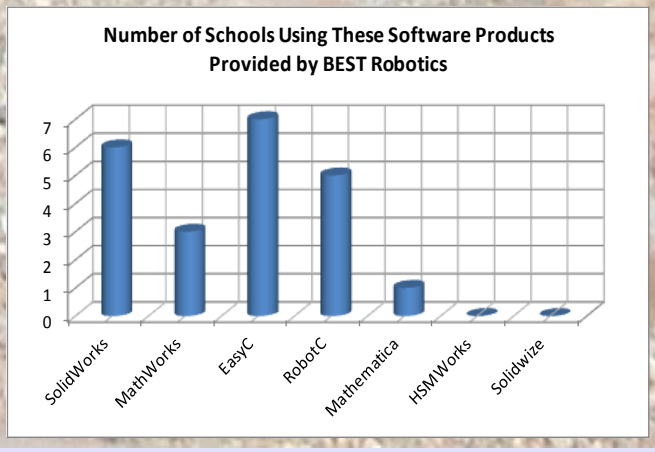


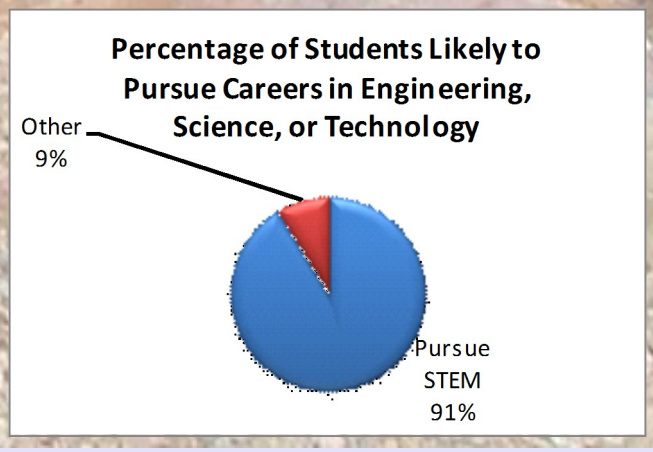








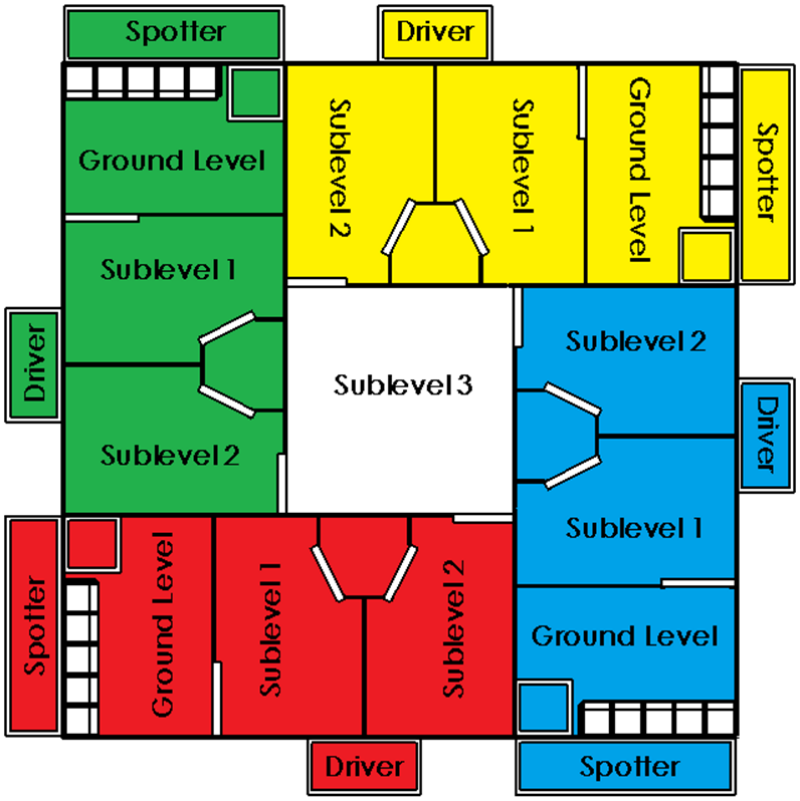




The Game Scenario

The 2015 BEST Robotics game is PAY DIRT with a mining and economics theme. The mine is far too dangerous for humans so a robot must be used in the mine. Initial evaluations of the mine have revealed five lucrative materials at various depths beneath the surface: Coal, Iron, Aluminum, Copper, and Lithium. There is also some Limestone Aggregate in an unstable tunnel.

Also the mine requires repairs to broken pipes and ventilation system. Much like the real mining industry, success in the competition will be determined by net profit and each team will be in direct competition with the other teams. As in the real world, the market values of the commodities will change over time, so priorities must be adjusted mid-contest.



The game is competed on a 24'x24' game field containing 4 colored quadrants. Each team has 3 mine levels and a shared central sublevel in the deepest part of the mine. The 4 teams compete simultaneously in 3 minute matches.

Task Set 1 – Repair the Mine
Goal: Repair the mine to make it safer.
Fix the air filtration system
Fix the broken pipes in Sublevel 2

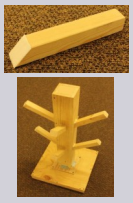
Task Set 2 – Extract Materials from the Mine
Limestone Aggregate
Coal (Rotating the support beam for the Coal Chute Tray is the tiebreaker)
Magnetite (Iron Ore)
Bauxite (Aluminum Ore)
Chalcopyrite (Copper Ore)
Spodumene (Lithium)
Extract Core Samples

A New Twist…

- Commodities (Coal, Magnetite, Bauxite, Chalcopyrite and Spodumene) will have their values changed between Seeding, Semi-Finals and Finals Phases due to Market Shift
- If all the teams are gathering mostly the same ore in a given phase, the value of that ore will drop in the subsequent phase
- Team Strategies should take this into account!

The Game Scoring

	Tasks	Points each
	**Repairing Air Filtration System** Transport filter from Spare Parts Rack on Ground level to Sublevel 1 & insert filter	ALL Rounds: 100
	**Limestone Aggregate** Transport ore from Tunnel 1 to Robot Starting Box	ALL Rounds: 2
	**Repairing Broken Pipes** Transport pipe from Spare Parts Rack on Ground level to Sublevel 2 & attach the pipe	ALL Rounds: 100
	**Core Samples** Get core sample from rack in Sublevel 3 and transport to Spare Parts Rack on Ground level	ALL Rounds Small: 50 Med: 100 Large: 150

	Commodities	Points each
	**Coal** Get from coal chute in Sublevel 1 and transport to Ground level Coal bin	Seeding: 5 Semi Finals: ? Finals: ?
	**Magnetite** Get from iron deposit in Sublevel 1 and transport to Ground Level Iron bin	Seeding 7 Semi Finals: ? Finals: ?
	**Bauxite** Get from aluminum vein in Sublevel 2 and transport to Ground level Aluminum bin	Seeding: 10 Semi-Finals: ? Finals: ?
	**Chalcopyrite** Get from copper cart in Sublevel 2 and transport to Ground level Copper bin	Seeding: 15 Semi Finals: ? Finals: ?
	**Spodumene** Get from lithium tower in Sublevel 3 and transport to Ground level Lithium bin	Seeding: 25 Semi Finals: ? Finals: ?

Scores are determined based on the positions of game pieces at the end of each match and are tallied by the Referee and confirmed by the Driver. Any game piece still in contact with the robot at the end of the match does not count. The score for each match is added to the previous match to create a cumulative score for each Phase (Seeding, Semi-Final and Final).

All scores are set to zero at the start of the Wildcard, Semi-Final and Final Phases. The Wildcard Phase consists of one match. The Semi-Finals Phase and the Finals Phase consist of 3 matches for each team.

Remember the twist - commodities will have their values changed between the Seeding, Semi-Finals and Finals Phases due to Market Shift.

The Teams

Front Range BEST Schools	City	Years Competing in BEST
Bear Creek High School ***	Lakewood	4
Chaparral High School++	Parker	4
Dakota Ridge High School* ++	Littleton	4
Englewood High School	Englewood	1
Highlands Ranch High School ***	Highlands Ranch	1
Lakewood High School	Lakewood	2
Legend High School*	Parker	3
Mountain Vista High School*	Highlands Ranch	2
New Vista High School* ++	Boulder	5
STEM Academy*	Highlands Ranch	6
Valor Christian High School	Highlands Ranch	3
WarrenTech	Lakewood	5

* Competed in the BEST Award
++ Competed at Frontier Trails Regional Championship
*** Did not compete at Game Day

Sponsors

NATIONAL SPONSORS

Founding Partner

Texas Instruments

National Partner

MathWorks

Equipment Provider

igus

Plastics for longer life

Software Providers

WOLFRAM

SolidWorks

HSMWORKS
The CAM solution for SolidWorks

intelitek

SOLIDWIZE

Robo matter
INCORPORATED

Front Range BEST Sponsors

Gold

BEST
Boosting Engineering, Science & Technology™

Rocky Mountain BEST

Silver

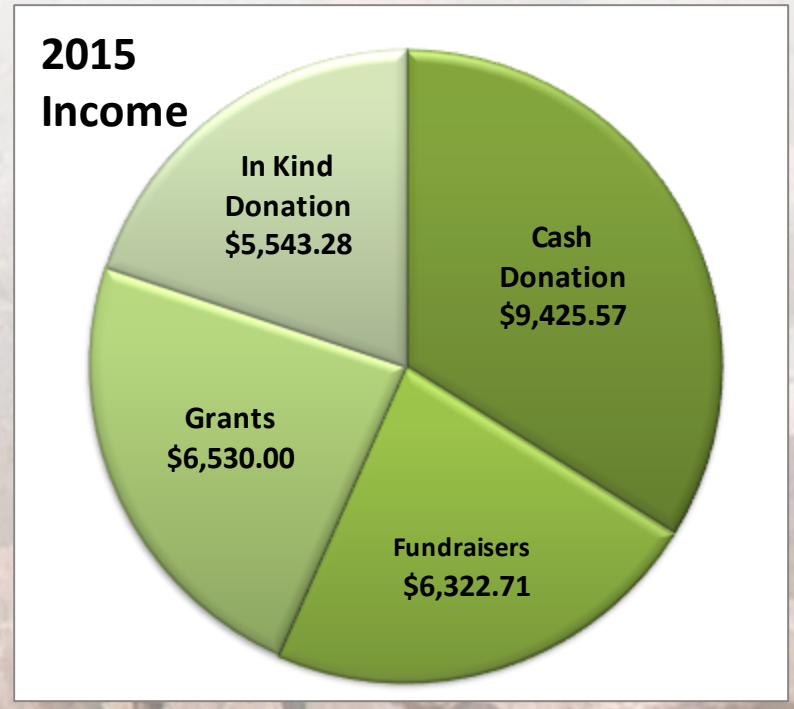
JEPPESEN
A BOEING COMPANY

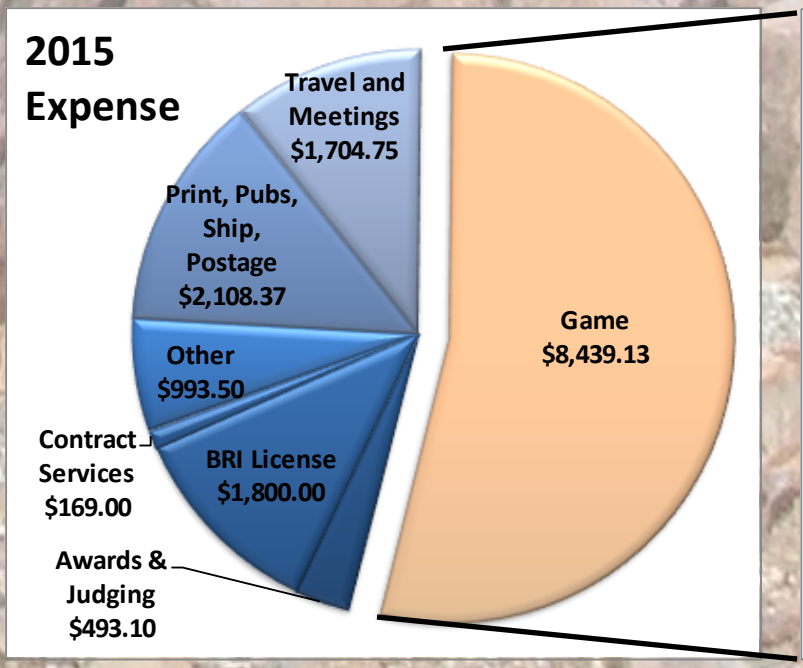
Arlene & David Bowman
Ivan and Angela Engleman
August & Kathy Geise
Phil & Susan Hardy
Joel & Tami Kirkland
John & Lois Walton

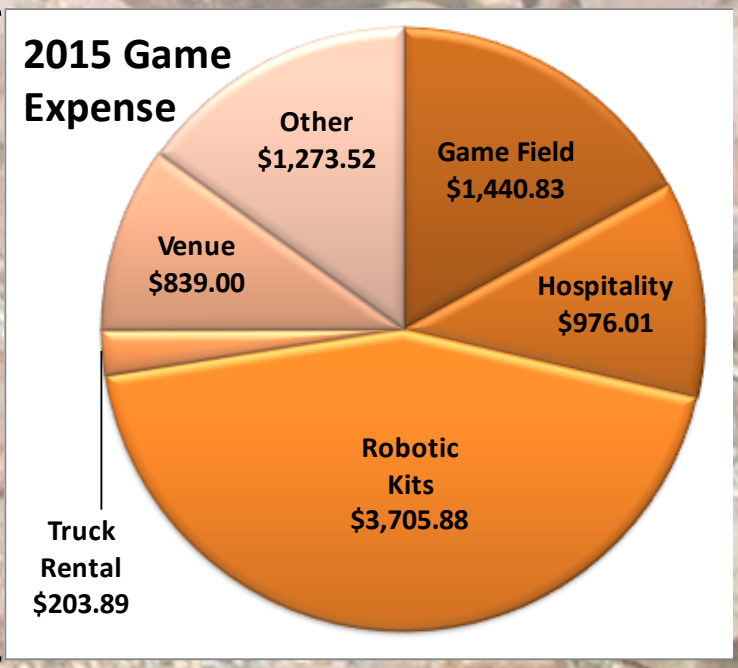
Bronze

Beaber Family Orthodontics
Disney Land
iRobot
Travelport

Financials


2015
Income
In Kind
Donation
$5,543.28
Cash
Donation
$9,425.57
Grants
$6,530.00
Fundraisers
$6,322.71


2015
Expense
Travel and
Meetings
$1,704.75
Print, Pubs,
Ship,
Postage
$2,108.37
Other
$993.50
Contract
Services
$169.00
BRI License
$1,800.00
Awards &
Judging
$493.10
Game
$8,439.13


2015 Game
Expense
Other
$1,273.52
Game Field
$1,440.83
Venue
$839.00
Hospitality
$976.01
Robotic
Kits
$3,705.88
Truck
Rental
$203.89

Testimonials

"My sons have participated in BEST for several years. Prior to BEST, one of my sons academic goals was non existent. With his learning disabilities, all he understood was what he can not do. What he has learned through BEST is what he can do. He learned by experience that building a robot did not "see" his disability and that he had something to offer. He is working hard at his goal to become Design Lead in the upcoming year. He has confidence now and has a STEM related academic goal. He is studying for his MET degree and started taking a few college courses while in High School. BEST changed his world from I can't to I can! This program is something all children should have the benefit to participate in."

BEST Mom (5 years)

"For me, BEST has always been more to me then simply a 'robotics competition'. It's a cross between the technical knowledge needed to make something work and the creative expression required to show that solution to the world. It's given me a chance to use every skill I have and then some, forcing me grow in ways I never knew I could. Without BEST, not only would I be lacking in my ability to solve problems, but I wouldn't be...me."

4 year BEST Student

Why do I coach a BEST team? My motivation comes from giving students something I never had: a life changing experience. I would have benefited greatly from BEST in my youth since I had so few similar opportunities. I would have learned valuable career and college applicable skills such as technical teamwork and communication skills. However more importantly I would have found a community to call my own, I see students develop confidence, initiative, and leadership when working with like minded students.

Team Coach and Industry Mentor

As a result of participating in BEST, students…

- Understand real-world use of mathematical concepts and applied physics.
- Experience real-world science and engineering challenges
- Training that is transferable to all academic disciplines and career pursuits.
- Understand what engineers do – engineering is "demystified".
- Experience "design-to-market" product development – experience that is transferable to all career pursuits.
- Receive recognition and acclaim typically reserved for their peers in sports.