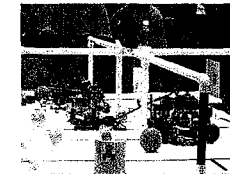


Where are we now: summary of scholastic robotics programs offered in Hawaii— a rich menu for Hawaii schools

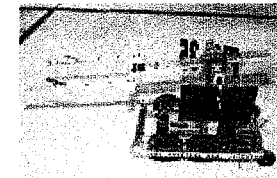
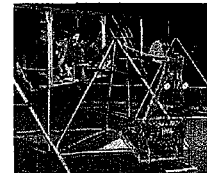
- Elementary school programs
 - FIRST Lego League
 - Junior FIRST Lego League



- Middle school programs
 - FIRST Lego League
 - Botball,
 - Underwater ROV (HURC, BIRR)
 - VEX



- High school programs
 - FIRST Robotics Competition
 - Botball
 - Underwater ROV (HURC, BIRR)
 - VEX
 - Micro Robot



- Robotics camps
 - Future Flight Hawaii (Maui)
 - Hilo Youth Robotics (Hilo)
 - Camp Eureka (Hilo)
 - Hilo Youth Robotics (Hilo)



Future Flight Hawaii

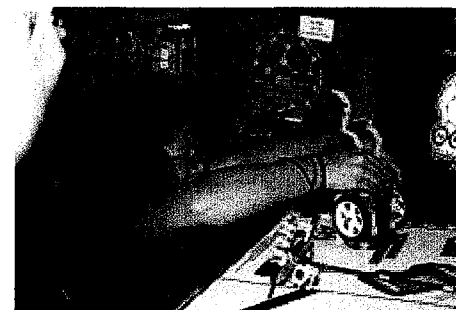
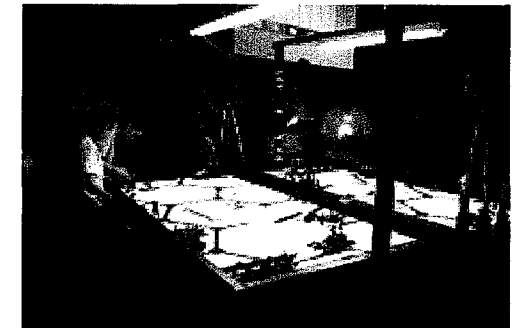
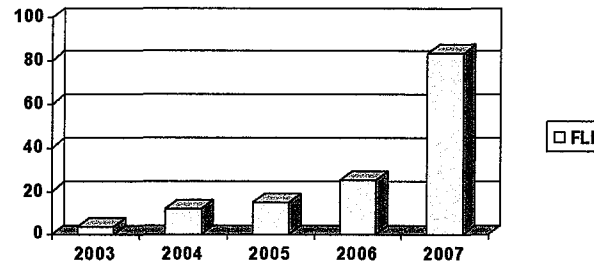
Using space to catalyze student interest in science, technology, and the future.

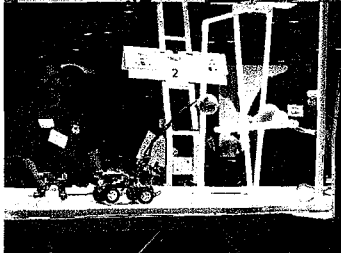
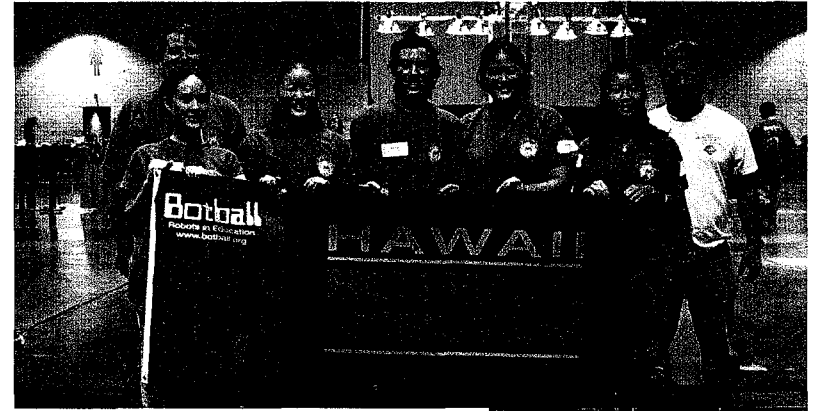
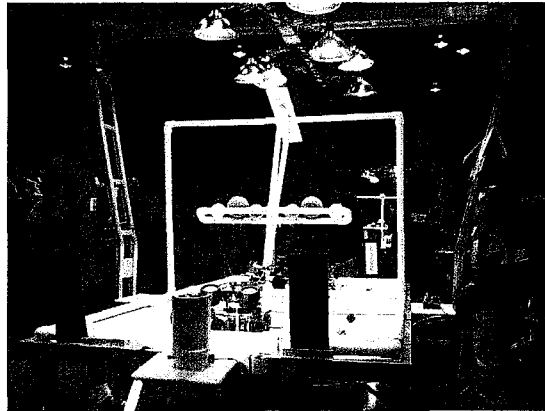
Space-themed educational programs

First Lego League



- **Dramatic growth**
 - 2006: 25 teams
 - 2007: 83 teams (54 schools)
 - 5 mini qualifying tournaments
- **State championship: Dec 1, 2007**
 - 1st: Iolani
 - 2nd: Aliamanu Middle School
- **International championship: Atlanta, April 2007**
- **State coordinators**
 - Sara Tamayose, retired DOE teacher
 - Aaron Dengler, Punahou
- **Sponsors**
 - HECO, DOE, A&B Foundation, isisHawaii, others





Continued growth

- largest regional tournament in US
- currently at 35 teams

State regional: May 10, 2008

- Hawaii Convention Center

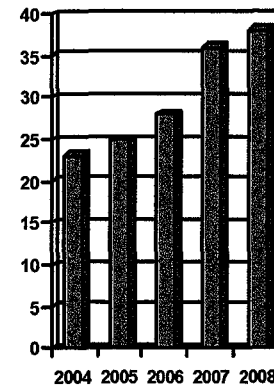
Global championship: Oklahoma, July 2008

State Coordinators

- Art Kimura, Hawaii Space Grant Consortium
- Paul Fetherland, HECO

Sponsors

- Hawaii Convention Center, College of Engineering, Hawaii Space Grant Consortium, HECO, Dual Alliance, NASA, DOE
- NASA subsidy to Hawaii Botball registration team increased from \$10,000 to \$14,000 annually



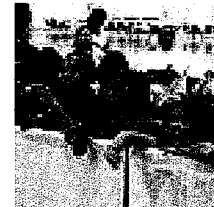
Botball



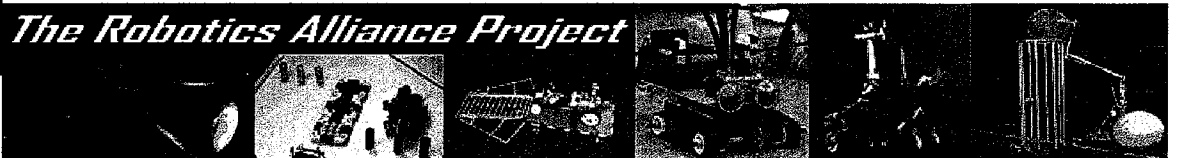


Honolulu hosted National Conference on Educational Robotics, July 2007

- *national Botball tournament**
 - 65 teams including 20 from Hawaii
 - largest Botball event in their history
 - Waiakea High School (4th overall)
- *workshops and poster sessions**
- *robotics showcase**
- *keynote speakers**
- *4 day conference**
 - over 500 hotel room nights
 - included cultural demonstrations
- *sponsors**
 - Hawaii Convention Center, NASA
- *want to return to Honolulu on a rotation basis**



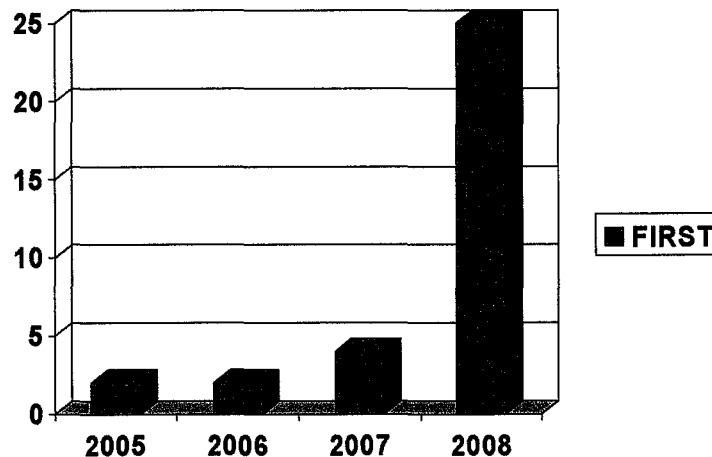
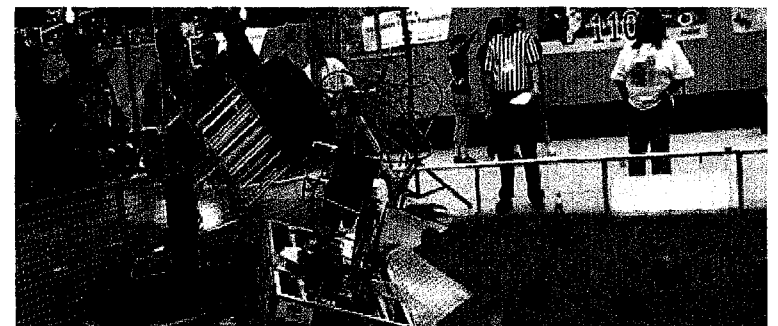
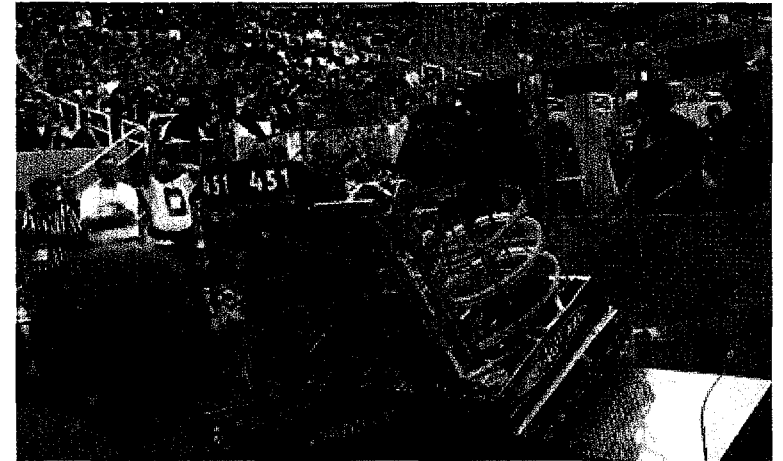
The Robotics Alliance Project





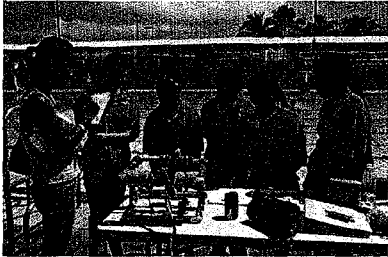
For Inspiration and Recognition of Science and Technology (FIRST)

- Largest growth among rookie teams in the nation
 - 2007: 4 Hawaii high schools
 - 2008: 25 Hawaii high schools
- Regional tournament: March 27-29, 2008
 - Stan Sheriff Center, University of Hawaii
 - 38 teams: 13 team from the mainland United States
- National FIRST championships: Atlanta, April 2008
- Regional director
 - Alex Ho, DBEDT
- Sponsors
 - NASA, University of Hawaii, BAE Systems, others





Hawaii Underwater Robot Challenge (HURC) Big Island ROV Regional (BIRR)



15-20 teams throughout Hawaii in two regional tournaments

-HURC tournament for 2007: cancelled

-BIRR tournament for 2008: registration not yet initiated

International tournament: San Diego, June 2008

HURC coordinator

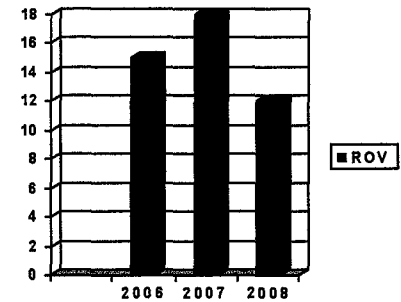
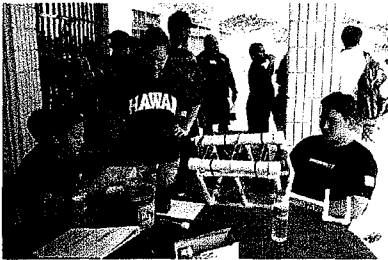
Mark Rongstad, SOEST, UH Manoa

BIRR coordinator

Cynthia Fong, Hilo Intermediate School

Sponsors

IEEE, HELCO, others



VEX Robotics Competition

2007: informal tournament, November 2007

13 teams from 9 schools

2008: official qualifying tournament, November 2008

30 schools statewide

International VEX Championship: Los Angeles, May 2008

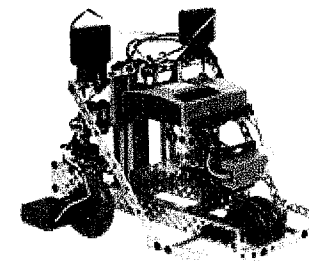
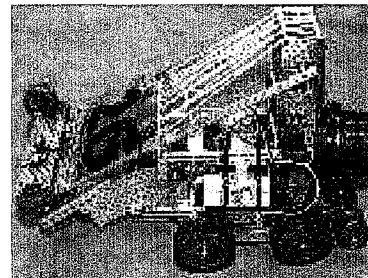
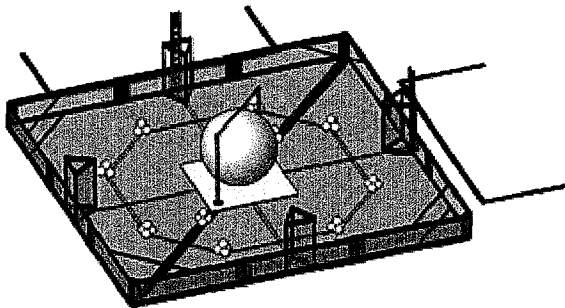
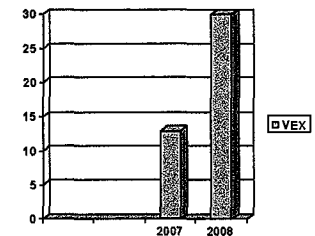
4 Hawaii teams invited

2008: Pan Pacific VEX Championship: Honolulu

100-150 teams from US mainland, Hawaii, S. America, Asia

State coordinator: Osa Tui, McKinley High School

Sponsors: seeking corporate sponsor



International Micro Robot Maze Contest, Nagoya, Japan, November 11, 2007



2007: Waiakea High School (1st American secondary school to participate)

**-competed against 35 teams from 8 high school and 9 universities
from Japan, Korea, South America**

-1st place, 1 cubic inch, autonomous maze contest, additional 3rd and 5th place

2008: Waiakea High School tentatively plans to send team

-compete in all categories including new bipedal robot contest



Coordinator

-Dale Olive, Waiakea High School

-Riley Ceria, Cal Tech Submillimeter Observatory

Included

**-tours of Miraikan National Museum of Emerging Science and Technology,
Sony ExploraScience, Toyota, Commemorative Museum, Meinan Technical
High School, Nagoya University College of Engineering**

Invited to send a student/teacher team to

-Super Science Symposium, October 2008, Ritsumeikan High School, Kyoto





Robotics and Technology Camps

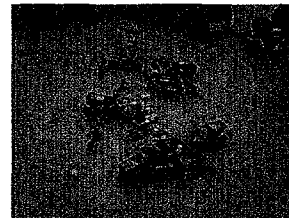
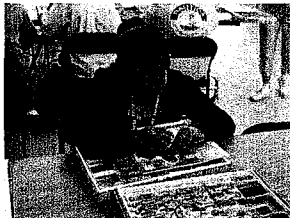


• Goals

- Accessible to everyone: summer, inter session, weekends.
- Professional development through lab school setting.
- Creates pipeline into middle/high school programs.
- Opportunity for high and middle schools to gain experience with working with younger students.
- Robotics club can earn funds for other program needs.
- Instructional, budget and program templates available for sharing.

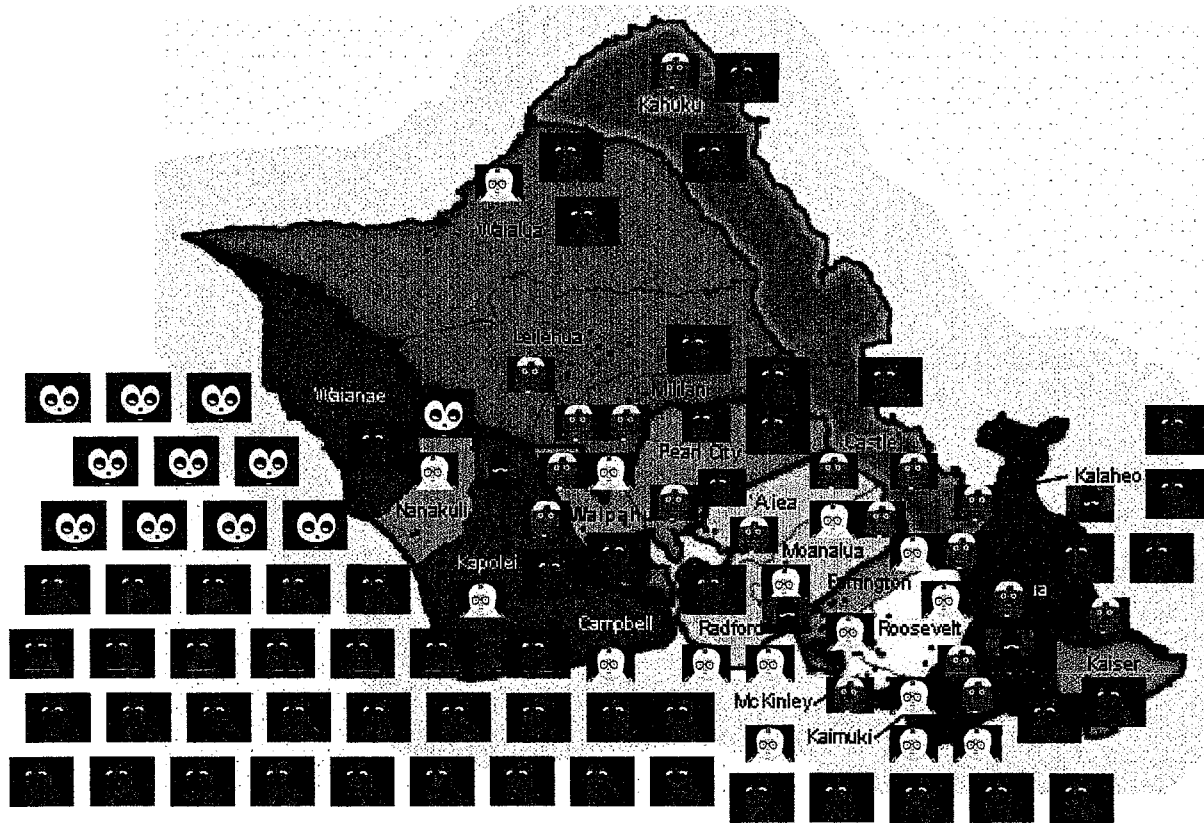
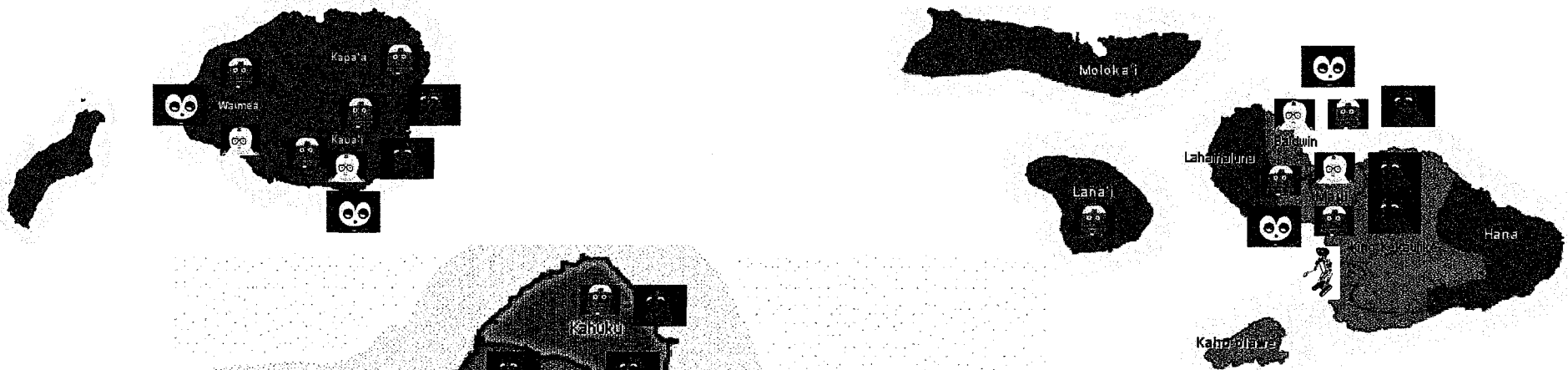
• Examples

- Future Flight Hawaii RoboTech Exploration (Maui)
 - Hawaii Island Robotics Academy (Waiakea High School)
 - Camp Eureka (Hilo High School)



94 public schools participate in scholastic robotics competitions

- **FIRST Lego League: 39 public schools (2007)**
 - Aikahi Elementary, Aina Haina Elementary, Aliamanu Intermediate, Assets, August Ahrens Elementary, Calvary Chapel, Connections PCS, DeSilva Elementary, Hahaione Elementary, Hanahouli, Hickam Elementary, Highlands Intermediate, Iao Intermediate, Iolani, Jefferson Elementary, Kaelepulu Elementary, Kaleiopuu Elementary, Kahuku Elementary, Kalakaua Middle, Kalihi Waena Elementary, Kamakahahelei Middle, Kaneohe Elementary, Kawanānākoa Middle, Kula High and Intermediate, Maemae Elementary, Makalapa Elementary, Mid Pacific Institute, Moanalua Elementary, Moanalua Middle, Momilani Elementary, Nawahiokalaniopuu, Niu Valley Middle, Noelani Elementary, Pearl City Elementary, Pearl Harbor Elementary, Pearl Harbor Kai Elementary, Pearlridge Elementary, Punahou, Sacred Hearts Academy, Seabury Hall, Thompson Academy, Waianae Intermediate, Waialua Intermediate, Mililani Middle, Waialua Elementary, Waipahu Intermediate, Washington Middle, Webling Elementary
- **Botball: 29 public schools (2008)**
 - Baldwin High, Earl's Garage, Farrington High, Hanalani Schools, Hawaii Preparatory Academy, Highlands Intermediate, Hilo High School, Hilo Intermediate School, Honokaa High, Iao School, Innovations PCS, Iolani, Kahuku High and Intermediate, Kamakahahelei Middle, Kapaa Middle, Kealakehe High, Kekaulike High, King Intermediate, Lanai High, Maui Waena Intermediate/Maui High, Moanalua High, Moanalua Middle, Olomana, Roosevelt High, Stevenson Intermediate, Wahiawa Middle, Waiakea High, Waiakea Intermediate, Waimea Canyon Middle, Waimea Middle, Waipahu Intermediate, Washington Middle
- **Underwater ROV: 9 public schools (2007; registering for 2008)**
 - Assets, Connections PCS, Hilo High, Hilo Intermediate, Kailua High, Kealakehe Intermediate, Mililani High, Moanalua High, Sacred Hearts, St. Josephs, Waimea High, Waters of Life PCS
- **FIRST Robotics: 16 public schools (2008)**
 - Baldwin High, Campbell High, Farrington High, Hawaii Baptist Academy, Hilo High, Honokaa High, Iolani, Island School, Kamehameha School, Kapolei High, Kohala High, Maryknoll High, Maui High, McKinley High, Moanalua High, Nanakuli High, Punahou, St. Louis High, Parker School, Radford High, Sacred Hearts Academy, Waimea High, Waiakea High, Waialua High, Waipahu High
- **VEX Robotics: new tournament, fall 2008**
- **Micro Robot: 1 public school (2007/2008)**
 - Waiakea High

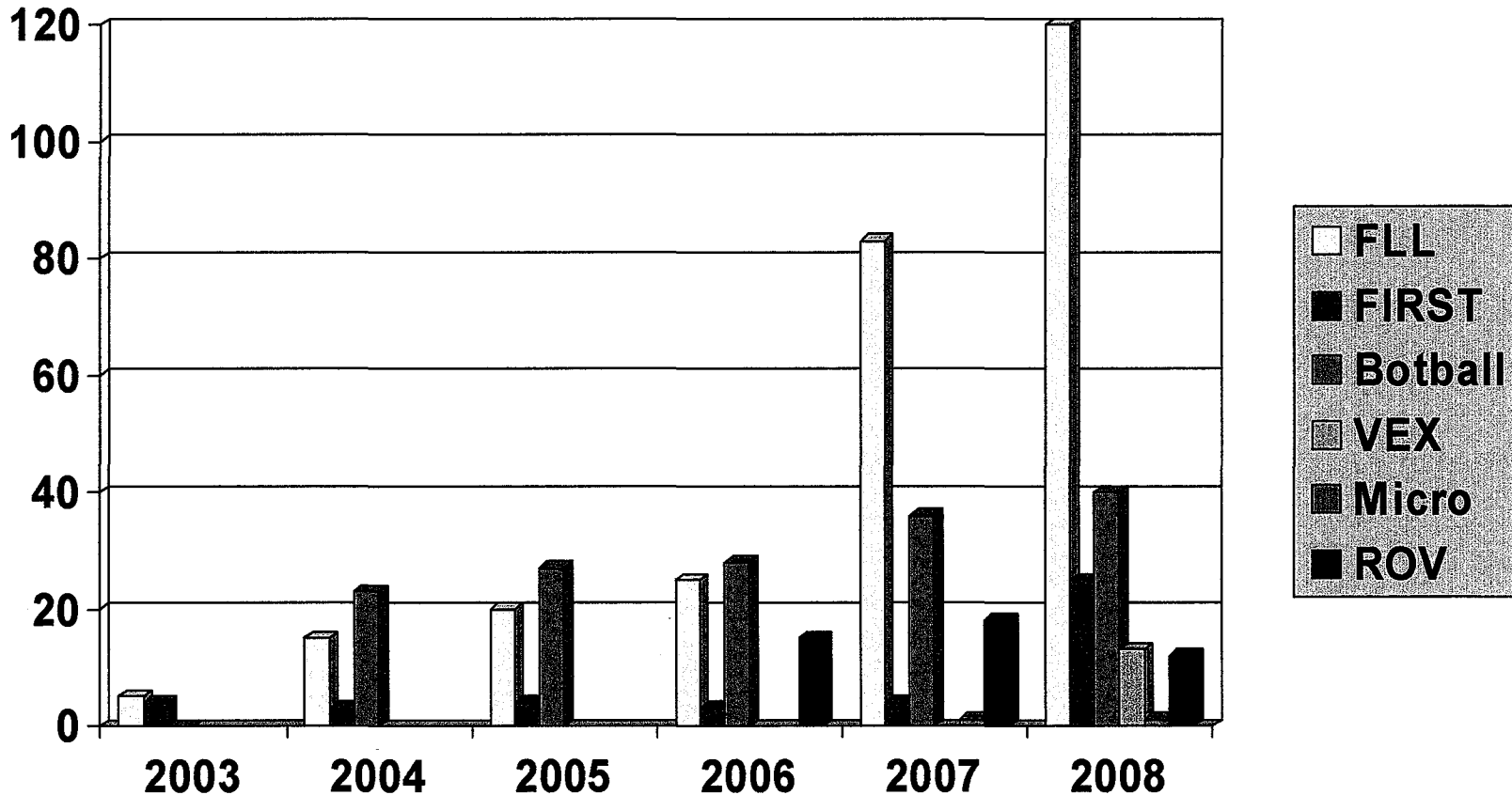


Statewide distribution of robotics teams and programs



-  **FIRST Robotics**
-  **FIRST Lego League**
-  **Robotics Camps**
-  **Botball Robotics**
-  **VEX**
-  **Underwater ROV**
-  **Micro Robot**

Projected growth of teams participating in Scholastic Robotics



Hawaii Excellence through Science and Technology (HiEST) Academies 2007

Kauai Complex Area

- All High Schools
- All Middle Schools
- Integrated Curriculum
 - Science Courses
 - Physical Science
 - Chemistry
 - Mathematics courses
 - Pre-Algebra
 - Algebra
 - Geometry

Oahu

- Waipahu High School
 - (Nanakuli/Pearl City/Waipahu Complex Area)

Pat Pederson will speak after our presentation regarding the current pilot site at Waipahu HS

HiEST 2008

- Six Pilot Sites
 - Waipahu 245 Students
 - Waialua 210 Students (ALL Grade 9-10)
 - Kahuku 180 Students (Grade 9)
 - Campbell 75 Students
 - Baldwin 180 Students (50% of Freshman Class)
 - Olomana 30 Students

Waipahu High School
 HI-EST Academy
 SY 2007-2008

Student Number	Current Grade	Tested Grade	Reading Proficiency Level	Reading Proficiency Status	Math Proficiency Level	Math Proficiency Status	Reduced Status	Gender	Ethnicity	Career Pathway
1	9	8	Approaches	Non Proficient	Approaches	Non Proficient	Reduced	Male	Filipino	IET
2	9	8	Meets	Proficient	Approaches	Non Proficient	Reduced	Male	Filipino	IET
3	9	8	Meets	Proficient	Meets	Proficient	No	Female	Filipino	Health
4	9	8	Approaches	Non Proficient	Approaches	Non Proficient	No	Female	Filipino	Natural
5	9	8	Meets	Proficient	Exceeds	Proficient	No	Male	Filipino	Health
6	9	8	Meets	Proficient	Meets	Proficient	Reduced	Female	Filipino	Health
7	9	8	Exceeds	Proficient	Exceeds	Proficient	Reduced	Male	Filipino	Health
8	9	8	Exceeds	Proficient	Exceeds	Proficient	No	Female	Filipino	Health
9	9	8	Exceeds	Proficient	Meets	Proficient	No	Male	Filipino	Health
10	9	8	Meets	Proficient	Exceeds	Proficient	No	Female	Filipino	Health
11	9	8	Meets	Proficient	Well Below	Non Proficient	No	Female	Hawaiian	Natural
12	9	8	Approaches	Non Proficient	Approaches	Non Proficient	Free	Female	Filipino	IET
13	9	8	Well Below	Non Proficient	Well Below	Non Proficient	No	Male	African American	IET
14	9	8	Exceeds	Proficient	Exceeds	Proficient	Reduced	Male	Hawaiian	Health
15	9	8	Approaches	Non Proficient	Well Below	Non Proficient	Reduced	Female	Filipino	Health
16	9	8	Meets	Proficient	Meets	Proficient	No	Female	Filipino	IET
17	9	8	Approaches	Non Proficient	Meets	Proficient	Reduced	Male	Filipino	Health
18	9	8	Exceeds	Proficient	Meets	Proficient	No	Male	Filipino	IET
19	9	8	Meets	Proficient	Meets	Proficient	Reduced	Male	Filipino	Health
20	9	8	Meets	Proficient	Exceeds	Proficient	No	Female	Filipino	Health
21	9	8	Meets	Proficient	Approaches	Non Proficient	Free	Male	Caucasian	Health
22	9	8	Well Below	Non Proficient	Well Below	Non Proficient	Reduced	Female	Hawaiian	Natural

23	9	8	Meets	Proficient	Approaches	Non Proficient	No	Female	Filipino	Health
24	9	8	Well Below	Non Proficient	Well Below	Non Proficient	Free	Female	Micronesian	Health
25	9	8	Exceeds	Proficient	Exceeds	Proficient	No	Female	Caucasian	Health
26	9	8	Exceeds	Proficient	Meets	Proficient	No	Male	Filipino	IET
27	9	8	Meets	Proficient	Meets	Proficient	Free	Female	Filipino	IET
28	9	8	Meets	Proficient	Meets	Proficient	Reduced	Female	Filipino	Health
29	9	8	Meets	Proficient	Approaches	Non Proficient	No	Female	Filipino	Health
30	9	8	Meets	Proficient	Exceeds	Proficient	No	Female	Filipino	Health
31	9	8	Exceeds	Proficient	Meets	Proficient	Free	Female	Filipino	Health
32	9	8	Meets	Proficient	Approaches	Non Proficient	Reduced	Female	Filipino	Health
33	9	8	Exceeds	Proficient	Approaches	Non Proficient	Free	Female	Filipino	Health
34	9	8	Meets	Proficient	Approaches	Non Proficient	No	Female	Japanese	Health
35	9	8	Exceeds	Proficient	Approaches	Non Proficient	No	Male	Japanese	Health
36	9	8	Meets	Proficient	Exceeds	Proficient	No	Female	Japanese	IET
37	9	8	Meets	Proficient	Meets	Proficient	Free	Male	Filipino	IET
38	9	8	Meets	Proficient	Meets	Proficient	No	Female	Filipino	Health
39	9	8	Meets	Proficient	Approaches	Non Proficient	No	Female	Filipino	Health
40	9	8	Meets	Proficient	Approaches	Non Proficient	Reduced	Female	Filipino	Natural
41	9	8	Exceeds	Proficient	Meets	Proficient	No	Male	Hawaiian	Natural
42	9	8	Well Below	Non Proficient	Well Below	Non Proficient	Reduced	Female	Filipino	Health
43	9	8	Meets	Proficient	Well Below	Non Proficient	Reduced	Female	Filipino	Health
44	9	8	Meets	Proficient	Approaches	Non Proficient	Free	Female	Filipino	Health
45	9	8	Exceeds	Proficient	Exceeds	Proficient	No	Male	Filipino	Natural
46	9	8	Approaches	Non Proficient	Well Below	Non Proficient	No	Female	Filipino	Health
47	9	8	Meets	Proficient	Meets	Proficient	Reduced	Female	Filipino	Health
48	9	8	Exceeds	Proficient	Exceeds	Proficient	No	Male	Japanese	IET

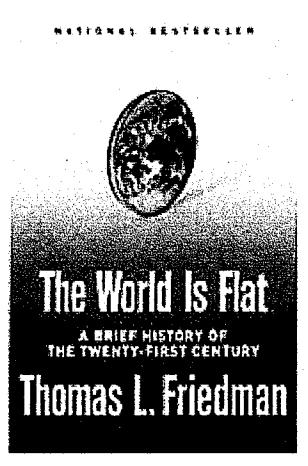
For Inspiration and Recognition of Science and Technology

FIRST

*Inspiring Students, Educators,
Professionals, and Communities*



I. STEM Crisis



***“The American education system... just is not stimulating enough young people to want to go into science, math, and engineering.”
(page 270)***

“...we have done a very poor job of conveying to kids the value of science and technology as a career choice...”

***NSF says: 1 MM Engineering/Technician jobs lacking trained people
TODAY***

- Will grow 10-15 times by 2020***
- By 2010, half of all US baby boomers gone***
- By 2020, other half will be retired***



II. Vision



“...not a supply issue, but a DEMAND issue...”

“...to create a world where science and technology are celebrated...”

...where young people dream of becoming science and technology heroes...”

Dean Kamen
Founder



III. Organization & Programs



Range of Programs K-12

FIRST Robotics Competition

FIRST Vex Challenge

FIRST LEGO League

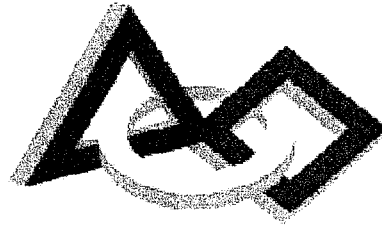
Junior
FIRST LEGO League

K 1 2 3 4 5 6 7 8 9 10 11 12

Grade Level



Inaugural FIRST Hawaii Regional Robotics Competition



FIRST
IN HAWAII

- **March 27 – 29, 2008**
- **Stan Sheriff Center, University of Hawaii Manoa**
- **38 teams from Hawaii and the U.S. Mainland**
- **25 teams from Hawaii**



Inaugural FIRST Hawaii Regional Robotics Competition



<u>Oahu Schools</u>	<u>Financial Sponsor</u>	<u>N. I. Schools</u>	<u>Financial Sponsor</u>
Nanakuli	Cedric Chong & Assoc.	Maui	E. Dowling Co., MECO, MEDB, TANF
Waialua	Various	Baldwin	TANF, MEDB
McKinley	BAE	Maui High	NASA + KEDB Aloha Ike Grant (\$5,000) + CSC (\$2,000)
Kapolei	NASA +	Kauai	NASA +
Sacred Hearts	NASA +	Waimea	
Radford	BAE +	Island School	
Iolani	BAE	Hawaii	TANF
Maryknoll	BAE	Waiakea	NASA +
St. Louis	NASA +	Kohala	TANF
Campbell	NASA +	Hilo	NASA +
Waipahu	TANF	Honokaa	NASA +
Punahou	NASA +	Parker School	
Moanalua	NASA +		
HBA	NASA +		
Kamehameha	Cedric Chong & Assoc.		
Farrington	NASA +		



Inaugural FIRST Hawaii Regional Robotics Competition



Federal Financial Support

NASA Event Support

Year 1 - \$150,000
Year 2 - \$125,000
Year 3 - \$100,000
Year 4 - \$0

NASA Team Support

20 Scholarships at \$6,000 each
20 Scholarships at \$6,000 each
20 Scholarships at \$6,000 each
10 Scholarships at \$6,000 each

Temporary Assistance for Needy Families (TANF)

Year 1 - \$100,000
Year 2 - \$100,000

(End Date June 29, 2009)



Private Sector Support for Scholastic Robotics Programs



Executive Advisory Board

Central Pacific Bank
Bank of Hawaii
Hawaiian Electric Co. Inc.
HSI Electric
Lockheed Martin Corporation
Marriott International
BAE Systems
Time Warner Telecom
Matson Navigation Company
The University of Hawaii
Altres, Inc.
Department of Education
Aloha Island, Inc.



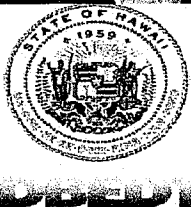
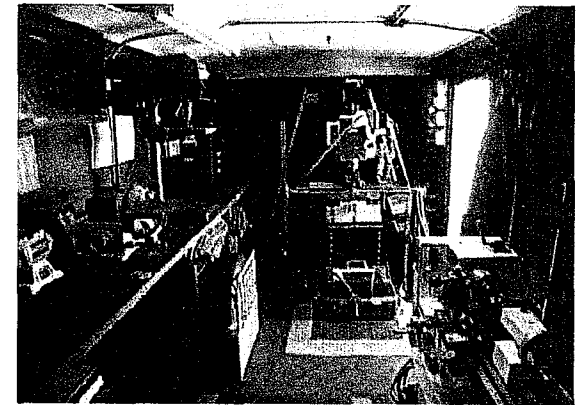
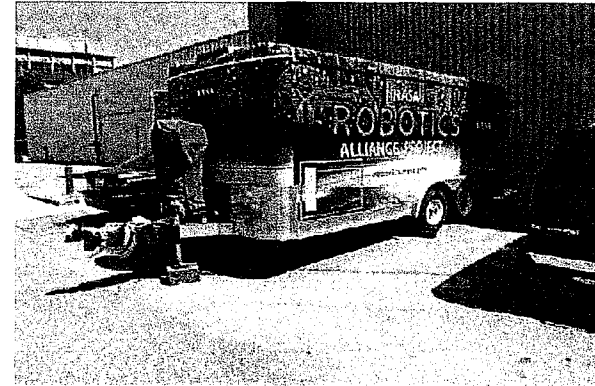
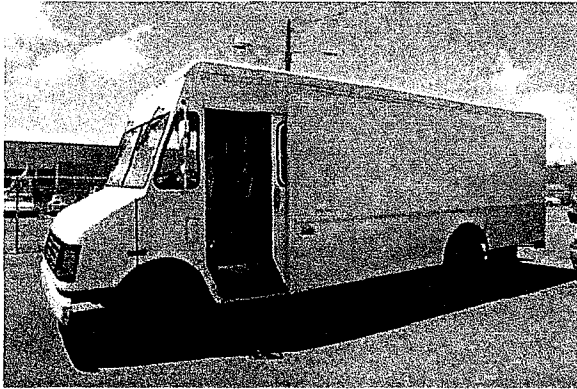
DEED



Public - Private Partnership Support for Scholastic Robotics Programs



“The State of Hawaii / BAE Systems Robotics Alliance”



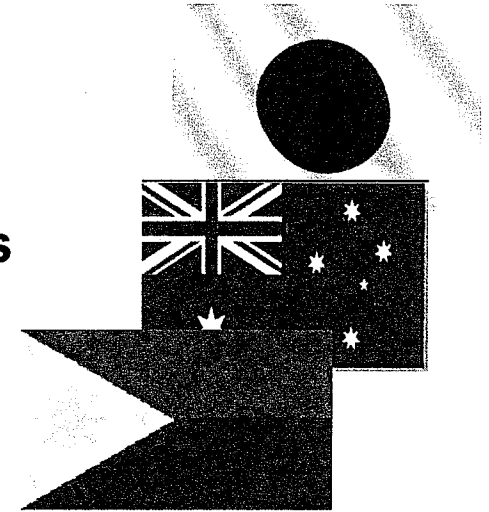
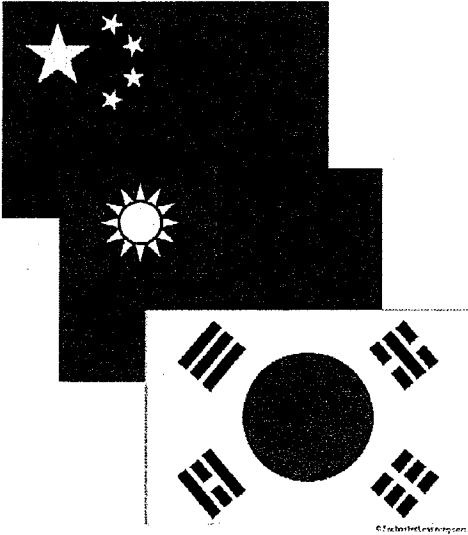
Future Endeavors



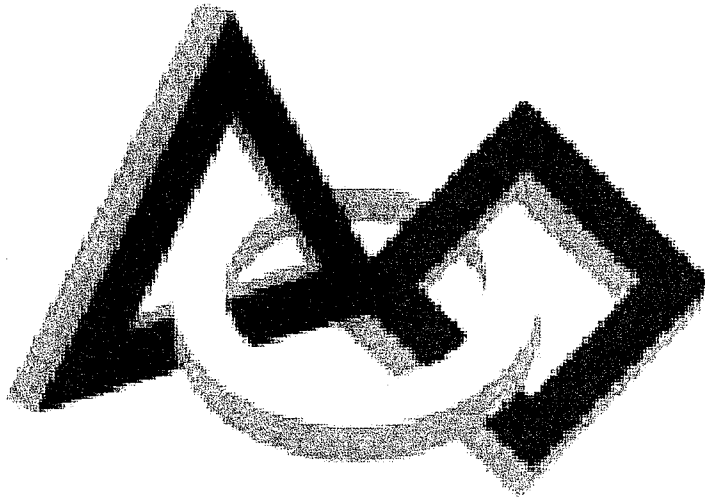
International Participation

Initially Limit to Asia-Pacific Countries
with Sister-State Relations:

China
Taiwan
Korea
Japan
Australia
Philippines



Questions?



FIRST IN HAWAII

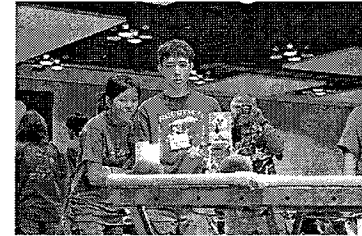


Art Kimura
Where do we go
next?

Act 111 (robotics)

- meet and collaborate with each of the robotics program coordinators
 - establish an advisory and oversight committee
 - determine needs for and work toward sustainability of programs, then expansion
 - coordinate schedule of events including tournaments to help avoid any overlapping schedules and conflicts
- meet and work with the Hawaii Department of Education
 - align program activities to standards, provide rubrics for assessment
 - develop complex wide initiatives from elementary through high school
 - qualifying credits for advancement for teachers
- meet with College of Engineering student organizations and faculty to develop partnerships
 - mentorship, community service
- provide professional development for teachers
- align activities with and collaborate with Pre Academy program, Project EAST, other STEM
- establish a tool for tracking
 - short and long term outcome for students: longitudinal, horizontal
- establish web site that lists programs, events, links to relevant web sites
- inventory grant opportunities and other funding sources
 - develop other sources of funding for teams
 - robotics and technology camps
- recruit and develop partnerships for schools
 - work with Executive Advisory committee (FIRST and other robotics fundraising)
 - team and tournament sponsors, mentor support
- meet with professional organizations representing technology, engineering and science interests
- support community events to publicize and promote robotics in education
- identify other project based learning STEM activities for 2008-2009

Act 111: \$314,925 for robotics (recommendation)



- **Allocation to each robotics program based on cost and number of participating schools**
 - Registration fees, kits, other needs for teams
- **Professional development statewide (targeting under represented communities)**
 - Instructional workshop, stipend for instructors, kits for participants
- **Robotics tournament support**
 - Provide at least 50% of anticipated funding required for tournament hosting
 - Provide infrastructure support for tournaments through one time capital investment in materials
 - Provide qualifying FLL tournaments on each of the islands
 - Provide first VEX qualifying tournament
- **New Initiatives**
 - Establish 5 pilot robotics camps statewide
 - Establish Pan Pacific Championship Tournament in Honolulu
- **National tournament support**
 - Registration fees, travel subsidy
- **Balance:**
 - Supplies, materials, travel, communications (specialists)
- **2.0 FTE allocation (requesting .5 additional=2.5 FTE)**
 - 1.0 FTE: Robotics Coordinator (program oversight, inventory programs, work with key program coordinators, establish outcomes/data base, establish a robotics education web site, coordinate with DOE/standards/assessment, plans for professional development, collaborate with other STEM organizations, support community events, establish an advisory committee)
 - 1.0 FTE: Robotics Education Specialist (FIRST Robotics Regional Director for Hawaii, work with other FIRST programs such as FLL)
 - .5 FTE: Robotics Education Specialist (Botball Regional Coordinator, work with other program coordinators such as VEX, underwater ROV, Micro Robot)

Hawaii is unique in the US

- **Act 111, 2007: provides full time state funded Robotics Education Coordinator and specialist and operating funds**
- **Expected outcomes**
 - Increase number of schools participating and provide infrastructure for sustainability.
 - Leverage what has already been successful in Hawaii and the partnerships already existing with DOE, industry, higher education, NASA, government including the military.
 - Collaboration and mutual support of identified programs.
 - Professional development and robotics kits for teachers.
 - Cohesively spiral programs from elementary to middle to high schools in each complex area.
 - Work force pipeline...inspiring more students to enter STEM related fields.....more students to enter University of Hawaii's College of Engineering.
 - Collaboration and support by the community, in particular corporations with STEM interest.
- **Needs**
 - Make permanent the pre academy Robotics positions (to attract the best candidate) and provide a regular allocation of funds to support schools.
 - Designate robotics and other academic teachers as “coaches” with small stipends similar to sports coaches to honor their commitment and time spent after school hours.
 - Sustain regional and attract national and international tournaments in Hawaii to reduce travel costs for Hawaii teams.
 - Investing in Hawaii tournament support allows more teams to participate by reducing travel costs.
 - Example: FLL qualifying tournaments on each island.
 - Robotics programs in general are coordinated by volunteers and are in a fragile status.
 - Example—HURC cancellation this year
 - Designate “Super Science Schools” in Hawaii where science, technology and mathematics are prioritized (with an award of additional funding and establishing links and partnerships with higher education), as model and lab schools.
- **Opportunities for non state funding**
 - Executive Advisory Board
 - Signature sponsorship of each program tournament by a corporation
 - Empowering schools: learn from those with successful partnerships (Waialua High School)
 - Federal funds (NASA, TANF, Office of Naval Research, Joint Venture Education Fund/JVEF)
 - Grants (need to establish or identify a 501C3 that can receive the funds for disbursement to schools)
 - Robotics and technology camps
 - Waiakea HighSchool partnership robotics/business academy partnership: net \$5,000 for one week camp