Building a FIRST Robotics team Utilizing the VEX System and Recognized Team Building Methods

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TEAM BLITZ

2007 DENVER REGIONAL ROOKIE ALL STAR WINNER

2007 *FIRST* Robotics Conference

FVC TO FRC – THE JOURNEY

IN THE BEGINNING…….

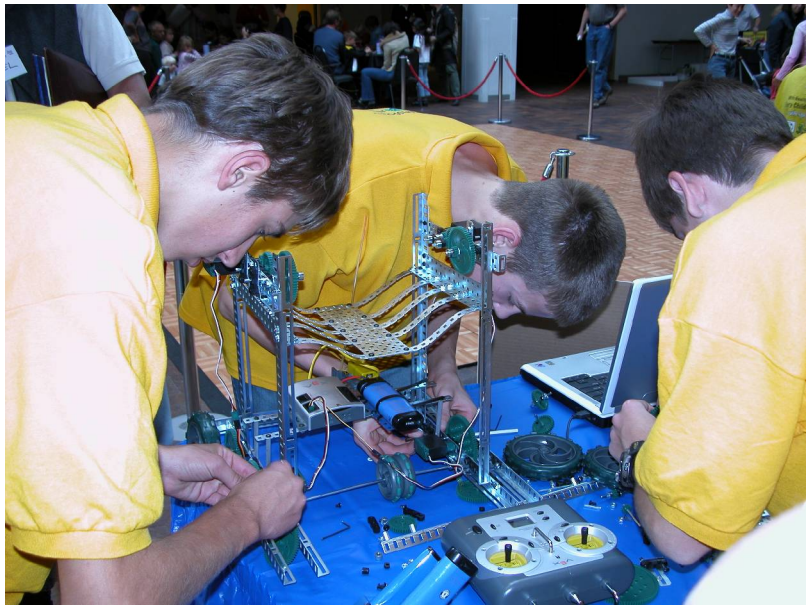
- HAVE A VISION
  - ROOKIE TEAM BLITZ WAS ORIGINALLY A VISION
    - SEVERAL TEAM MEMBERS HAD PARTICIPATED IN FLL (TEAM BLOCKIUM) AND ATTENDED THE WORLD COMPETITION IN 2005, VIEWING FVC FOR THE 1ST TIME
- FIRST PROVIDED THE CHALLENGE
  - FVC PROVIDED THE ACCESSABILITY
    - THE 285 CORRIDOR PROVIDED THE TALENT

➢FIRST VEX CHALLENGE - FVC

- VEX ROBOTICS KIT WAS ENGINEERED FOR FIRST
  - 500 Pieces in each customizable kit
  - KIT CONTAINS SIX SUBSYSTEMS WHICH DEVELOP CONCEPTUAL UNDERSTANDING
    - Structure
    - Motion
    - Control
    - Logic (Programming)
    - Sensors
    - Power

ENGINEERING CONCEPTS DEVELOPED

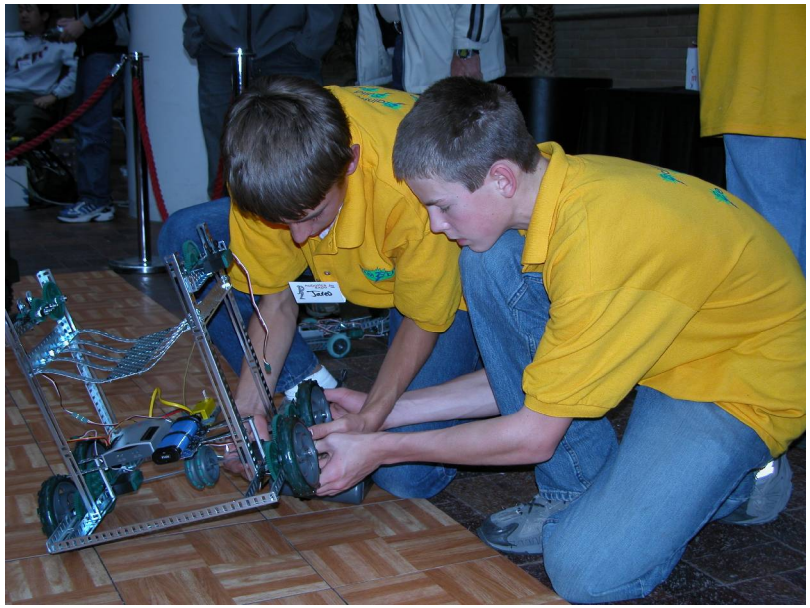
- STRUCTURAL
  - CHASSIS DESIGN AND SUB-ASSEMBLY
  - CENTER OF GRAVITY
  - STABILITY
  - ROBUSTNESS444
  - SIZE REQUIREMENTS



ENGINEERING CONCEPTS DEVELOPED (cont)

- MOTION
  - Motors vs. Servomotors
  - Clutches
  - Speed vs. Torque
  - Gear Ratio
    - Idler Gears
    - Drive Train
  - Non-Gear Systems

    Belt or Chain Drives



ENGINEERING CONCEPTS DEVELOPED(cont)

- MOTION (cont)
  - Wheel Size vs. Acceleration
  - Friction
    - Tread Design vs. Terrain or competition surface
- CONTROL
  - Transmitter/receiver concepts
  - Tank Style vs. Arcade Style Control/Joysticks
  - Frequency Crystals
    - Radio Frequencies
    - Electromagnetic Waves

ENGINEERING CONCEPTS DEVELOPED(cont)

- LOGIC
  - Micro Controller Functions
  - Digital vs. Analog
  - Autonomous vs. Remote Control (RC)
  - Easy C Language

ENGINEERING CONCEPTS DEVELOPED(cont)

- SENSORS
  - Bumper Switch
  - Limit Switch
  - Ultrasonic Range Finder
  - Line Tracker
  - Light Sensor
  - Optical Shaft Encoder

ENGINEERING CONCEPTS DEVELOPED (cont)

- POWER
  - Battery Types/Terms
  - Voltage and Energy
    - Standardized throughout the systems
  - Battery Care

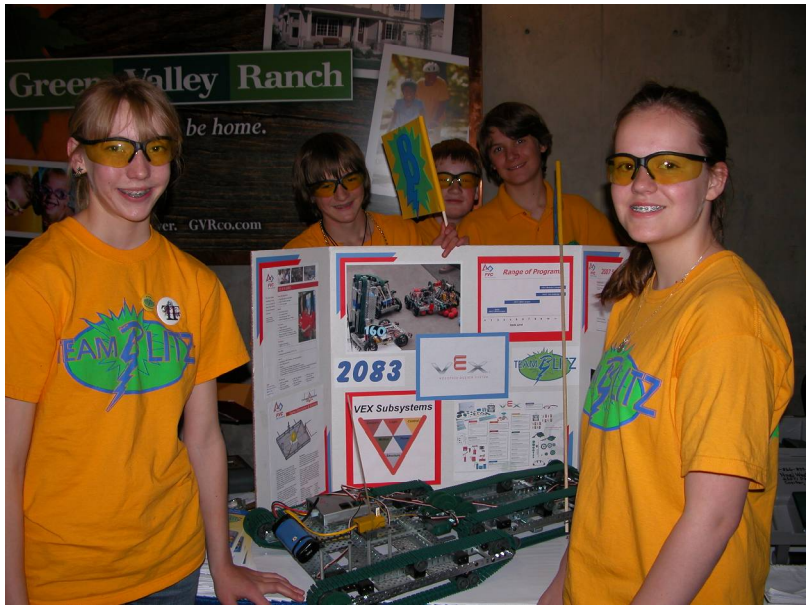
COMMUNITY OUTREACH

- TEAM BLITZ FVC PARTICIPATION
  - Denver Museum of Nature and Science Robotics EXPO
    - Students were given the opportunity to display and teach what they had learned up to this point instilling a sense of confidence while informing the community about the FVC and the VEX robotics kit
  - EXPO Preparation Included
    - Brochure Development
    - Team Blitz Banner Fabrication with Team Motto
    - Team Shirt Design
    - These helped create the Team's identity

COMMUNITY OUTREACH (cont)

- Team Blitz Provided a FVC Demo At Our FRC Mentors School, Faith Christian's TEAM 1826, Science and Technology EXPO during 2007 FRC build season
- Team Blitz put on FVC Demo both days of Denver FRC Regional event
- FVC Experience Developed Poise and Confidence for the FRC Open House, Conifer Chamber Demo and the FVC Display At the Colorado Regional

DENVER REGIONAL VEX DEMO



FVC CHALLENGE AT Faith Christian Build Site

- Our mentor Team, Faith Christian, put on an after school FVC Challenge in December of 2006 with a maze that required autonomous operation and use of sensors
- Challenge then had an RC portion when a "soccer" game was played between two Alliance's in a round robin tournament

FVC Challenge Competition

- FVC game was beneficial for several reasons
  - Required the development of a robot to accomplish a specific task
  - Building of the robot had a time table that had to be met
  - Robot development required both autonomous and RC portion of the game
  - Game involved the use of Alliance partners to be successful
  - Game gave first insight into whole idea of FVC and FRC and how to partner with other teams

FVC Challenge Game (Cont)

- Other benefits of FVC Challenge
  - Competition taught lessons of Engineering
    - Replacing mechanisms just prior to competition without evaluating
    - On-site repairs required when robots failed

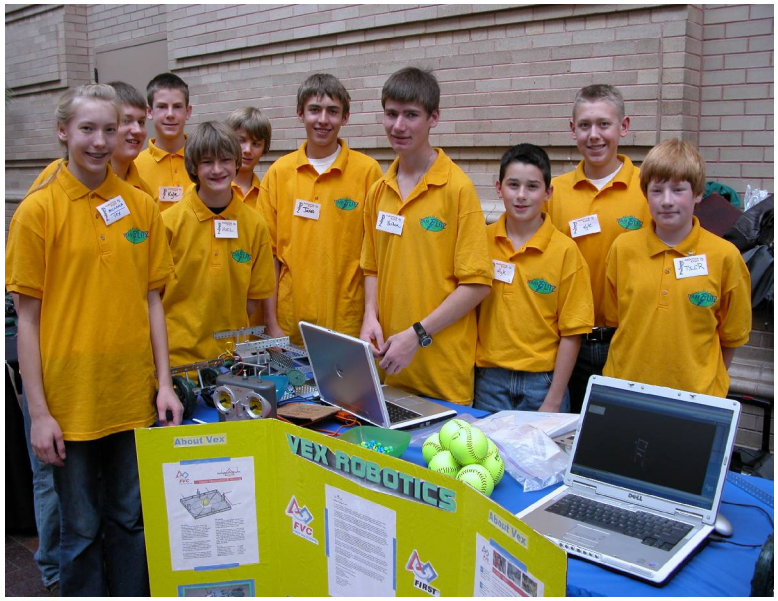
COMMUNITY OUTREACH

- Denver Museum of Nature and Science

BRAINSTORMING

COMMUNITY OUTREACH

- Team Blitz Demo at Denver Museum of Nature & Science Nov. 2006



Team Blitz Candybot

BENEFITS OF AN FVC TEAM

- Provides the FIRST Challenge In an Affordable and Accessible venue
- Teaches Engineering Concepts which are used in FRC
- Gives Team members an opportunity to build and develop concepts to be used on FRC robot
- Provides Community Outreach Opportunities for the Teams

TEAM DEVELOPMENT

- By Developing a FVC team, the Students Begin to Determine Their Strengths and Interests From the Various Disciplines
- Team Play and Interaction is developed before the intense 6 week design and build period of FRC
  - Can be used to develop challenges and work to deadlines and specific end goals
    - Maze and "soccer" game at Faith Christian involving participation of several teams

Team Development-November 2006

SPONSOR & FUNDRAISING DEVELOPMENT

- Photographic documentation of FVC team provides additional marketing value of the team for the crucial fundraising required on FVC
- Team Blitz CD/DVD produced to give as a thank you gift to our sponsors
- Team Blitz CD/DVD given to the president of the Conifer Chamber of Commerce to be used as a fundraising tool

FRC-THE NEXT STEP

- Taking the plunge into an FVC team
  - A major step, but doable with dedicated mentors and helpers
  - Financing an issue with $6k registration requirement
  - NASA grant critical for rookie teams that do not have funding
    - Allows starting a team with little funds
  - Even limited funding allows for team development and formation of the Team

FRC-THE FIRST WEEK

- Development of the Team
  - Team decision on what aspects of challenge to pursue
    - Game is typically multifaceted
      - Autonomous, game, end game
    - Can be difficult to pursue all aspects as a rookie
    - Build for a specific task or the entire game
  - Breaking the students into build teams
    - FVC gives them insight into their areas of interest
    - Develop subgroups dependant on what we decided above

FVC ROLE IN DESIGN OF FRC VEHICLE

- FVC Benefits
  - Teaches students the basics of building
    - FVC experience gives them insight into design development
      - FVC teaches about many aspects that carryover
      - Our programmers used similar concepts as developed in FVC
      - Use of basic tools helped students in build phase
      - FVC gave indication to students as to their interest

FVC Benefits Conclusion

- FVC is a valuable, accessible method of teaching the basics of the FIRST vision
  - Kits are reasonably priced
  - Students with no experience can use the kits
  - Learning the principles is enhanced with the well organized and easily understood handbook
  - Challenges can be made that are a good simulation of challenges experienced in the FRC
  - Kits and its various systems are easily adapted to a variety of robots, both simple to very complicated