

Getting Started & Resources for your FIRST Team



Outline

- The Mechanics of Six-Weeks
- Resources to Learn About Building a FIRST Robot

You can't "do everything"

- as a robot
- as a person
- as a team

Pick individual items and do those selected items well.



The Mechanics of Six-Weeks

- Six weeks is a short time to build anything, let alone a sophisticated, computer controlled, electromechanical machine!
- We're all in the same boat - & that is the joy of it all
- Relax and breathe deeply
- Repeat the last step often



The Mechanics of Six-Weeks: General Guidance

- Time moves quickly & so must your team
- Organize plans & materials BEFORE you need them
- Get your electronics and controls first working on a prototype board to learn about them
- Assemble KitBot base/drive system ASAP
- Design your robot to be unassembled one less time than the number of times it is assembled
- Leave 1 week to practice with your finished robot



6 Weeks = 1 Robot Process

- Week 1: Designing the Robot
 - Team strategy to play the game
 - Developing a robot to accomplish
 - Don't try to have the robot do everything
 - Document your design
 - Assemble KitBot base & drive system
- Week 2: Subsystem Design
 - Divide the robot & team into subsystems
 - Prototype each subsystem to work as a stand-alone item
 - Set a deadline for prototype demonstrations & STICK TO THAT DEADLINE (ex. 2nd SAT of the 6 weeks)



6 Weeks = 1 Robot Process

- Week 3 & 4: Subsystem Construction
 - Apply what you learned from the prototypes to design subsystems
 - Carefully design these subsystems first on paper, CAD, or other modeling methods
 - Be aware that the subsystems will need to be integrated together, BUT don't allow the integration need to delay the subsystem design process
 - Once a design is completed, THEN construct each subsystem using legal parts
 - Each subsystem must be fully operational and demonstrated on the 4th SAT



6 Weeks = 1 Robot Process

- Week 5: Design Integration
 - Before integrating the hardware, use modeling methods to integrate the components (such as hand drawings, CAD or cardboard foam mock-ups)
 - Be aware: Despite the best of communications, the integration of subsystems will be difficult
 - Because of the small amount of robot real-estate, only so many hands can work on the robot at one time.
 - Scheduling “robot availability” time for each subsystem team is recommended
 - The robot must be completed by the 5th SAT
 - Formally celebrate the above accomplishment!



6 Weeks = 1 Robot Process

- Week 6: Testing & Driver Training
 - Test - Improve - Retest
 - Give the programming team their own scheduled time w/the robot
 - Don't be bothered when the robot “breaks” since this is telling you something to improve
 - Drivers need time to get experienced
 - Develop an operational checklist
 - Develop a tool kit (to travel with) and a list of needed spare parts



A Different Look at Six-Weeks: General Guidance

- Build starts Saturday -1/5/08
 - Build ends Tuesday – 2/19/08
 - How long is 6+ weeks
 - 45 days
 - 2700 minutes
 - 162,000 seconds
- NOT LONG ENOUGH.....or is it????



Plan

- Create a time plan for your team
- Post it where all can see
- Refer to it and members progress at all team meetings
- Don't let items slip in time – add resources to areas that have time issues.
- Plan time for things to go wrong



Week 1 (1/5 – 1/12/08)

- Attend Kickoff – all 15 slots should be filled - Saturday
- Study and Learn game rules- print copy of rules for each team members – quiz members about rules - Saturday
- Familiarize team with Kit Of Parts - Sunday
- Meet with team and brainstorm game strategy - Sunday



Week 1 (1/5 – 1/12/08)

- Brainstorm design of robot for selected game strategy- choose 2 designs, involve entire team so that entire team owns design - Sunday
- Brainstorm key robot systems – are you using pneumatics, sensors, programming, unique transmissions
- Order structural materials, get wood or foam board for modeling. Get safety glasses for all team members. Enforce their use!!!
- Decide which key field structures to build



Week 1 (1/5 – 1/12/08)

- Identify build team members
- Break build team up into – base, arm, and computer groups
- Set a schedule that gives students time for homework, family, and part time jobs.
- Emphasize SAFETY- identify a Safety Captain- train people on machines BEFORE they use them. Supervise! Supervise! Supervise!



Week 1 (1/5 – 1/12/08)

- Entire build team meets
- Each group presents ideas and initial design in foam board or wood models- demonstrate function of part
- Entire build team questions design and decides yeah or neigh! If neigh, group is assigned more people to help job along
- Build! Build! Build!



Week 2 (1/13 – 1/19/08)

- Groups build and design prototypes
- Identify and order materials ASAP
- Each group must constantly communicate with other groups for size and weight info.
- Constantly check weight.
- Base should be built – programmers can start programming autonomous mode



Week 3 (1/20 – 1/26/08)

- Modeling complete
- Build actual robot parts – file all parts as they are mounted on robot.
- Remember to be ROBUST!
- Communicate with other groups
- Take pictures of your robots progress



Week 4 (1/27 – 2/2/08)

- Complete robot build
- Test moving parts
- Check weight and dimensions
- Plan where team number, lights, and names are placed



Week 5 (2/3 – 2/9/08)

- Test and debug your robot
- Select your drive team and let them drive the robot
- Practice the autonomous mode
- Secure a crate for transport – or build it
- Make a cart to carry your robot around the competition area



Week 6 (2/10 – 2/16/08)

- Drive practice, practice, practice
- Go to pre-season events if you can
- Make shipping arrangements for your robot
- Take lots of pictures for your chairman's award submission
- Celebrate! Have a team party to show off your robot and all the other things that your team has accomplished. Have food, dessert and music!!



Ship your Robot

- Ship date is Tuesday, Feb. 19th by 5pm.
- Get documentation from ship company that they received your robot before this time
- Pack your robot, batteries, and robot cart in the crate. Be aware of the weight limit of 400 lbs for free crate shipment (??)
- YOU DID IT!!!



Resources to Learn About Building a FIRST Robot

- Books
- Web Information
 - FIRST web site
 - FIRST Sponsors web sites
 - Team-to-team information exchange
- Other teams as a resource & mentor



Resources: Books

- Hard copy references about robot building exist at your bookstore or search Amazon.com
- Most are hobbyist-based texts on robot building for "other" robot competitions
- Many contain technical information that applies to FIRST robot construction
 - Example: "Kickin' Bot" was written by FIRST team leader Grant Imahara & dedicated to FIRST Team 841



Resources: Web Information

- FIRST Web Site (<http://www.usfirst.org/>):
 - There are many locations where information is contained on the FIRST site
 - Rule book contains many web links (www.usfirst.org/robotics/doc_updt.htm)
 - "For Teams, By Teams" contains excellent "getting started" & tutorial training (<http://www.usfirst.org/community/frc/content.aspx?id=7006>)



Resources: Web Information

- FIRST Web Site (<http://www.usfirst.org/>):
 - "How to Build a FIRST Robot" workshop presentations (from the Championship) (<http://www.usfirst.org/robotics/2004/Workshops/champwork.htm>)
 - Mentoring page is your tool to find a local team to help you with FIRST (www.usfirst.org/robotics/mentoring.htm)
 - The search engine finds specific information that isn't available by "hunting and clicking"



Resources: FIRST Sponsors Web Information

- Innovation First
(www.innovationfirst.com/FIRSTRobotics/)
 - FIRST robot control system
 - Download and print of all their documentation - it is very well written & necessary to read
- NASA (robotics.nasa.gov/events/first.htm)
 - Real time & Archived webcasts of FIRST Kick Off and FIRST Competitions (why try to tell folks about the KO when you can let them view it themselves)



Resources: Web Sources for Parts

- www.ifirobotics.com - IFI Robotics - official supplier of FIRST parts
- www.andymark.biz - AndyMark, Inc. - wheels, transmissions, etc.
- www.mcmastercarr.com - McMaster-Carr - lots and lots of parts and widgets



Resources: Team-to-Team Web Information Exchange

- Many team-to-team sites exist. The most popular is www.chiefdelphi.com
- Discussion Forums:
www.chiefdelphi.com/forums/index.php?
 - Sorted by topics w/a very useful search engine
 - Post a question, get a response
 - Not authoritative, but rather are guidance
 - EXPTREMELY HELPFUL



Resources: Team-to-Team Web Information Exchange on “chiefdelphi.com”

- White Papers:
www.chiefdelphi.com/forums/papers.php?
 - Team written “How to Guides”
 - Great source for FIRST-specific technical information
- Photo Album:
www.chiefdelphi.com/forums/pictures.php?
 - Great idea starters based on other teams’ designs



Resources: Team-to-Team Web Information Exchange – Another Great Site

- FIRST Robotics Canada Site :
<http://www.firstroboticscanada.org>
 - Excellent technical presentations (PowerPoint and PDF) on running a team, robot design, mobility, pneumatics, controls and the competition
 - An Image Gallery arranged in a format to help teams get ideas, with images sorted by robot functions such as arms, drive-trains, elevators, and all other components



Ready, Set, GO (almost)

- FIRST is Fun Hard Work
- Congratulations for being involved in something REALLY BIG & REALLY SPECIAL
- We wish you not just “Good Luck” but also “Good Design”

