ETCE Toy’s N More Yearly Update

Fayette Campus
Contents

• Introduction
• Background
• Purpose
• Approach
• Conclusions
• Student Presentations
Introduction

• Matthew Cuppett
  – Adjunct Faculty at Penn State Fayette since 2010
  – Senior Design Engineer; Project Manager at ABB, Inc.
  – Penn State BSME ‘06, MSME ‘08
Several teachers at Fayette have used the toys program but I will talk about my experience.

Started using in EDSGN 100 Sp11.

Following, implemented in Fa11 (MET 105) and SP12 (EDSGN 100).

Dedicated 7-8 weeks to Toy’s N More broken into two sections (EDSGN 100):
  – Standard Toys
  – Lego Mindstorms

Used Toy’s N More for MET 105 as final project using Mindstorms.
Purpose

• Problem Solving
• Innovation
• Group work
• Project management
• Fun
Approach

• Two Sections, as mentioned
  – Lego Mindstorms
  – Standard Toys
• The two sections cover all aspects mentioned in the Purpose slide
• Legos are used in a competition manner
• Standard toys are used as research and development tool
Lego Mindstorms

• Design a singular Lego robot that competes
  – Hill climb
  – Tug of war
  – Line Follower
  – Style
    • Peer voted
  – Features
    • Write a marketing pamphlet
  – Introduction to Patents

• Group project that encourages compromise
  – Won’t win every competition but chose wisely to have the best well-rounded robot
Lego Mindstorms

EDSGN100 Spring 2012
Lego Mindstorms Design Project
400 pts

Group

Team Name

Directions:

Work through the design process as a team to produce a Lego robot capable of doing three main tasks: Tug of war, Hill Climb, and Obstacle course. The obstacle course will be comprised of a line to follow and a hard object to avoid (touch or other), and get back on the line. Tug of war will be graded on how well in a tournament style bracket, hill climb will be based on hill steepness (time trial/teaser), and the score will be time based.

No changes to be made after start of competition. Only repairs.

Each competition will be 100 pts for a total of 300. Competitions will begin on March 25 and end on April 1.

1st place in competition 100 pts
2nd place in competition 77 pts
3rd place in competition 55 pts
4th or 5th receives 30 pts

Style competition (Voted by class but not for yourself):
1st receives 25
2nd receives 24
3rd receives 23
4th and 5th receive 20

Features competition (1 page pamphlet describing all functional features...introduction to marketing):
1st receives 25
2nd receives 24
3rd receives 23
4th and 5th receive 20

The remaining 30 pts is from documentation (30) and participation (20). This is somewhat subjective but is to prevent teams from just showing up to get a good grade.

Documentation

- Patent—one design per team can be patented to prevent other teams from using that feature. Must be specific. Do not disclose to other teams. Fill out attached paper and submit to instructor. First come first served.
- Design review on March 20
  a. Word Document outlining brainstormed ideas, why that design is chosen, what are pros and cons of design, and possible improvements in the future.
  b. Powerpoint explaining design to class—each must talk, roughly 10 – 15 min.

PSU EDSGN 100 Spr2012 PATENT DISCLOSURE

Members of invention team:

Title of invention:

Description of invention (attach sketch or draw on back):

Prior Art (current other options):

Advantages of invention:
Standard Toys

• Two approaches used thus far
  – Existing toy modification
    • Improvements
    • Working prototype
    • Introduces R&D
  – Disassembly
    • Disassemble and Reassemble
    • Teaches good documentation
    • Builds understanding of how components interact

• The method is chosen based on time remaining in semester
  – Lego Mindstorm ran long in Sp12
EDSON 100 - Spring 2011
M. Cuppett - Instructor

Design Exercise #3 - New Toy Design

Standard Toys

© 2012 Matthew Cuppett

Toy Design

Your toy design team has been given the task of building a prototype of a new idea for a children’s toy. Your group is to brainstorm toy ideas, and choose the best design to build a prototype. Your idea should be something unique. If you are building off of an existing toy design, then you should add something new to the existing design.

The goal of this assignment is to work in a group to evolve your brainstormed ideas into a functional prototype. The final prototype is not going to be identical to the original ideas that your team brainstormed. You will make decisions based on cost, functionality, safety, and aesthetics that will change your design. If your toy design is something that is too large in scale (too expensive) to build a life-size prototype, then you can build a scale model of your design.

For You To Do:
By now your group has brainstormed initial ideas for new toy designs. Next, you will refine those ideas. You will look at cost, practicality, demand for the toy, etc. Your group will narrow the ideas into a single design. You will then look at what has already been done that is similar to your idea. You may find that something is already on the market that is virtually identical to your design. You will then need to try something different, or devise some way to make your similar design unique from the existing toys.

The goals for this exercise, in relation to the design process, are:

(1) Refine brainstormed ideas into a working prototype.
(2) Make decisions about good and bad aspects of your design and modify accordingly.
(3) Build a working prototype or model of your toy design.

Deliverables:
(1) submit a 1-2 page typed paper that describes your toy design.
   a. safety issues
   b. cost of manufacturing the toy
   c. suggested retail value
   d. suggested age group
   e. marketing strategies
   f. drawings of what you envision the final product will look like should the toy go into production
      i. These drawings can be freehand sketches, manual technical drawings, AutoCAD drawings, or any other type of graphic that you feel most comfortable with

(2) Working Prototype

(2) Presentation (April 12)
   a. Each team member covers an equal part of the presentation
   b. Design idea (sketches/drawings/models)
   c. Anything that you feel can better convey your design idea (video, testimonials, trial runs, etc.)
   d. How to market this... you are essentially selling your idea to the instructor

Grading: Grading for the assignment will be as follows:

Prototype
How well does the prototype convey design idea......................15 pts.
How original/unique is the design...........................................15 pts.
Written Report
Description/analysis of prototype..........................................15 pts.
Use of graphics to convey design idea...................................15 pts.
Presentation
Oral presentation of design..................................................15 pts.
Preliminary design review...................................................15 pts.
Group presentations deadlines.............................................10 pts.

Total.................................................................................100 pts.
EDSON 100  
Spring 2012  
Final Project  
Due May 1, 2012

Toy Assembly (100 pts)

Introduction
Engineers benefit from being organized, keeping clear records, and developing an understanding of the problem at hand. To practice this, we will do something that many of us did as children—dismantling toys.

I have disassembled many toys in my day but had the problem of not getting them reassembled. Through experience, I learned how to do just that; now I apply that to my cars, household projects, and everyday work.

This project will let you work as a group to learn these skills.

Directions
1. Choose a toy
2. Play with it. (50)
3. Record
   a. What is it (10)
   b. What is it made from (10)
   c. What does it do (10)
4. Take it completely apart (10)
   a. Remove all screws
   b. Don’t break it
5. Take pictures of the disassembled toy (50)
6. Label the pictures (name it part and make a list of parts – this is called a bill of materials) (50)
7. Record what you learned about the part (30)
   a. Internal features
   b. Pros/Cons
   c. Future improvements
8. Reassemble
9. Make an instruction how to assemble (good idea to do it during disassembly)
10. Presentation
   a. PowerPoint documenting 3-9 (220 breakdown above)
   b. Each person speak (20)
   c. Show toy back together and working (60)
Conclusion

• Students and design teams embraced concept
• Students worked during class and after-hours since they enjoyed it
• The designs and robots were clever and innovative
• Students learned how to work together to achieve a common goal
• Leaders naturally emerged
• Students got a taste of public speaking while presenting designs
• Most of all, they had fun (while learning, of course)
• In all, very effective way to get students engaged in learning and I look forward to continuing Toy’s N More