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Catapult - Throwing Device

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Catapult

Principles of Engineering

Technology Education

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Brighton Central School District

The Problem

- Design a device that can toss a penny into a 2” diameter target placed 15’ away (precision).
- Design a device that can lunch a penny the greatest distance.

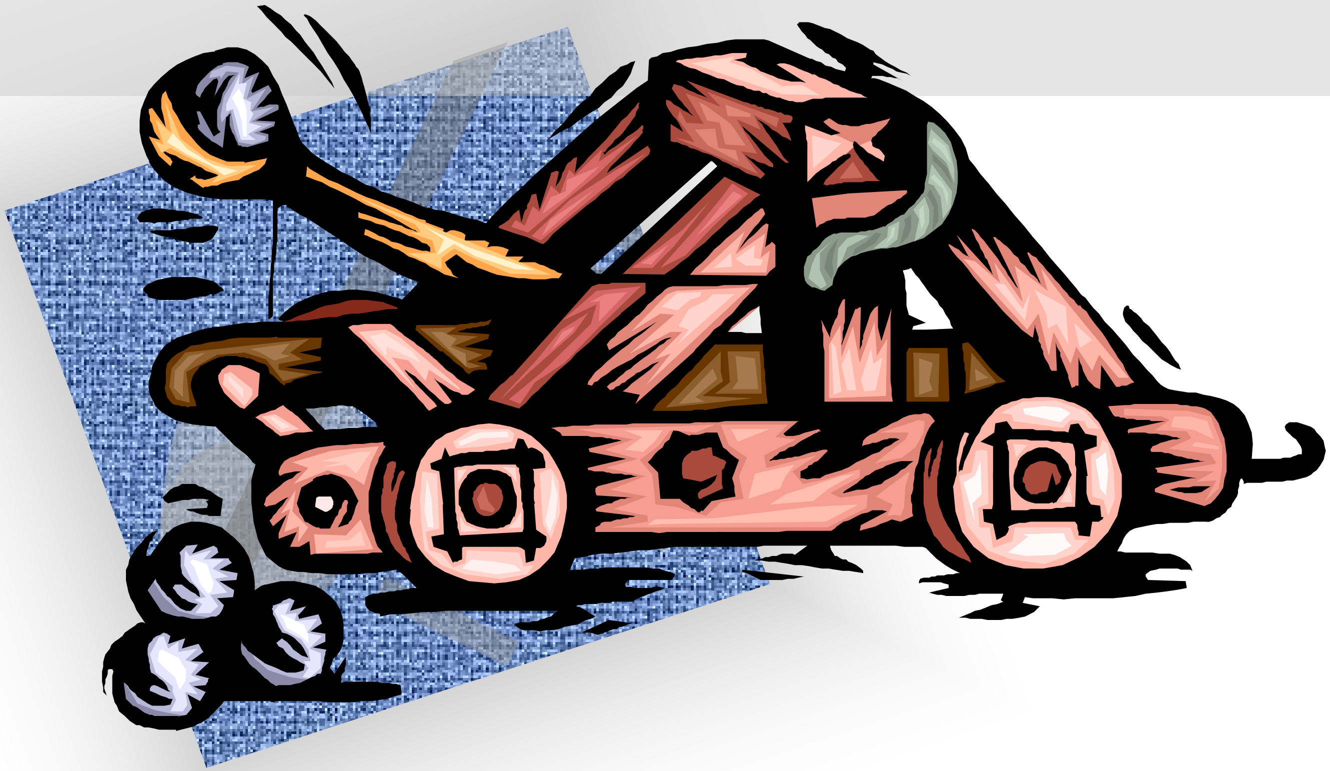
Constraints

- May only use the materials provided by the instructor.
- The device must sit on the ground.
- It must have a trigger mechanism.

Before Construction Checklist

- ✓ Brainstorm and Research
  - ✓ Develop two (2) models minimum using Interactive Physics.
- ✓ Select Optimal Solution
  - ✓ Determine dimensions.
  - ✓ Draw/sketch optimal solution.

Catapult Design

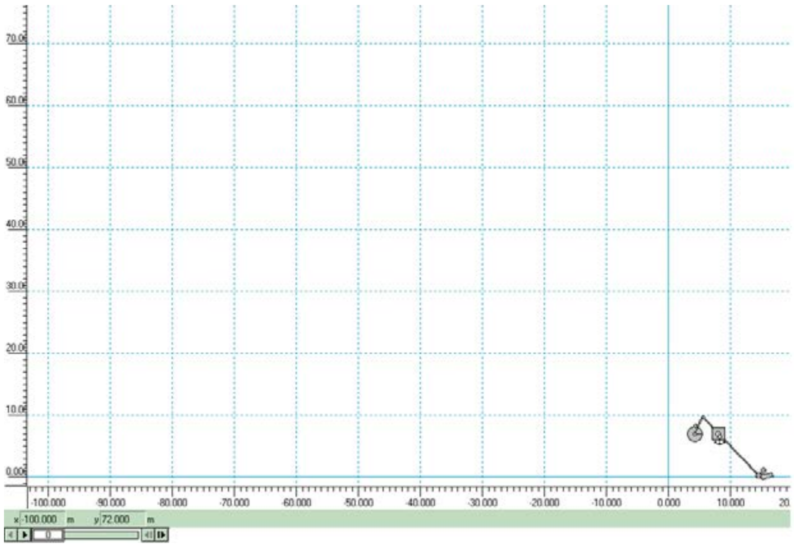


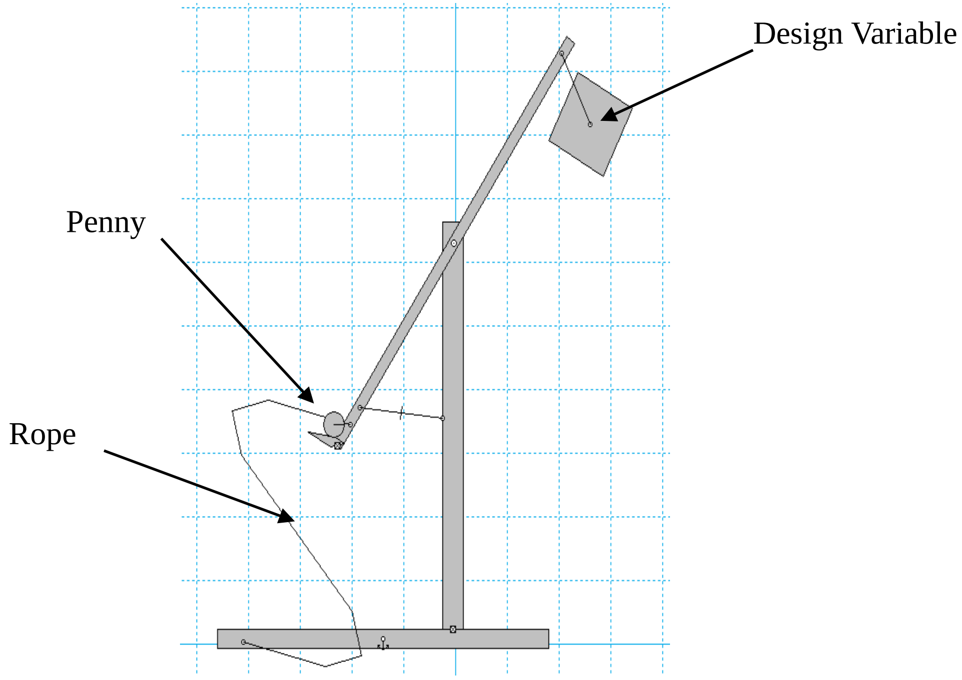
Our Goal

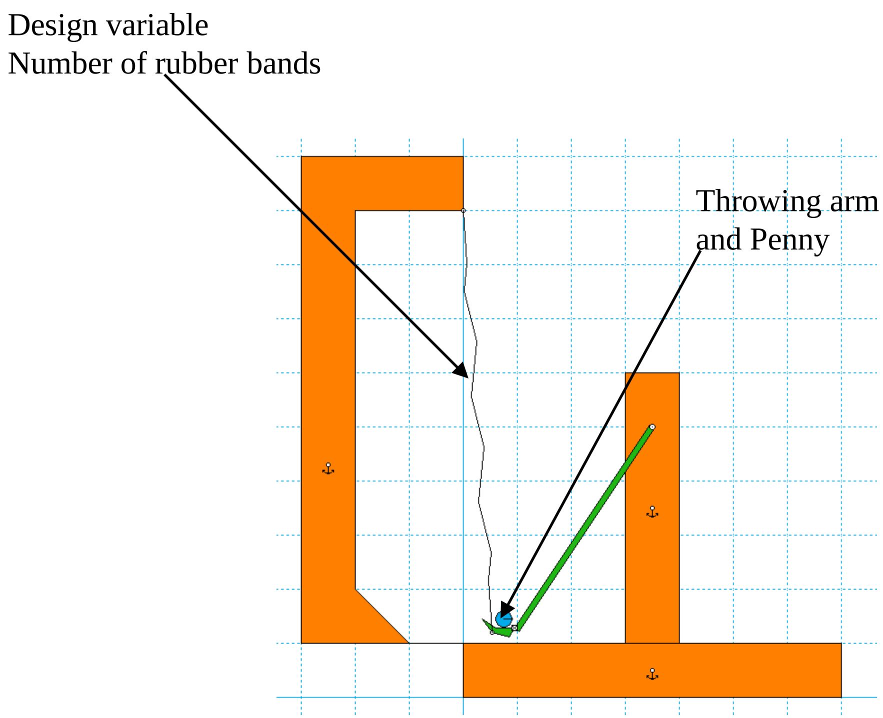
- Our goal is to throw the penny 15’ into a target.

Brainstorming

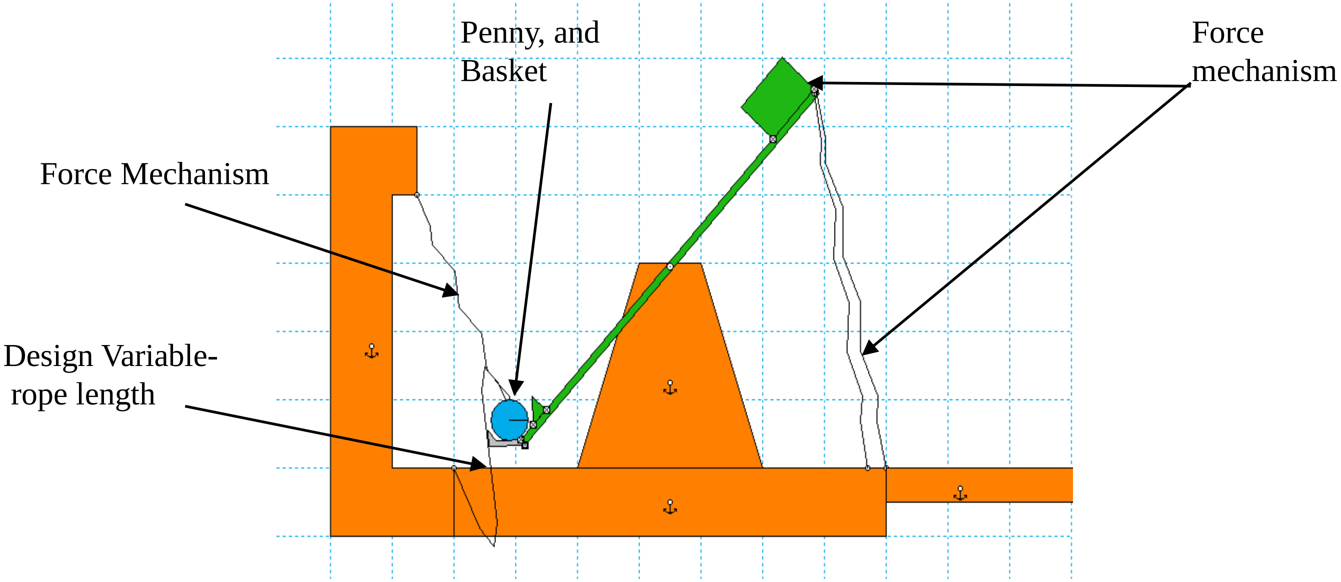
- We used Interactive Physics to test and see our designs and chose which one would suit the problem best.

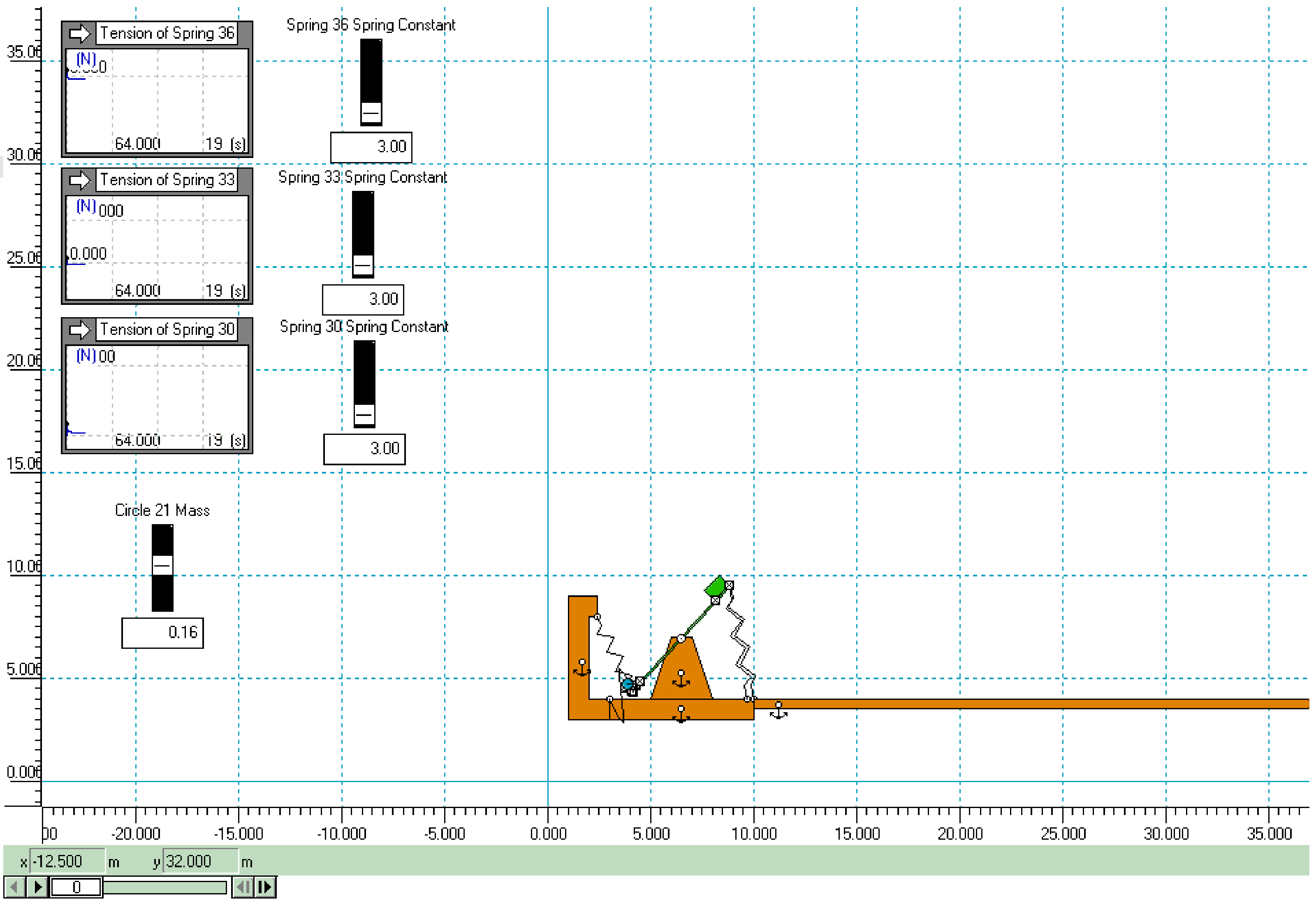



Design Variable
Penny
Rope


Design variable
Number of rubber bands
Throwing arm
and Penny

Optimal Solution



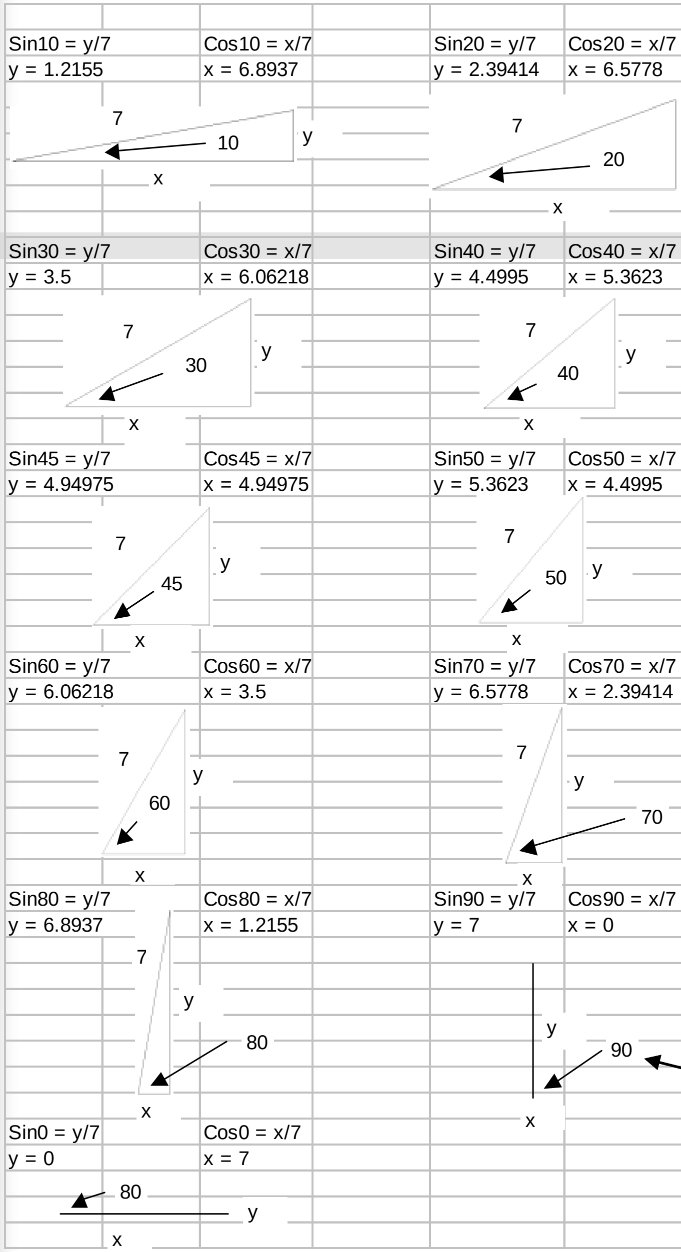


Tension of Spring 36
Spring 36 Spring Constant
3.00
Tension of Spring 33
Spring 33 Spring Constant
3.00
Tension of Spring 30
Spring 30 Spring Constant
3.00
Circle 21 Mass
0.16
x -12.500 m
y 32.000 m

Post-competition

- How did your catapult perform? Explain.
- How close did it get to the target?
- How far did it toss the penny?
- Why does the penny continue to fly after it has left the catapult?
- Define the variables to control the distance.

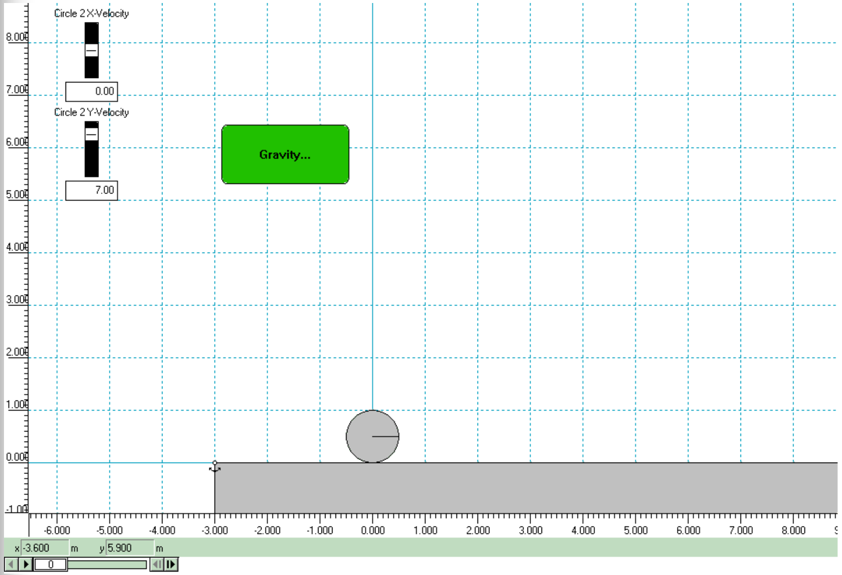
Conclusion

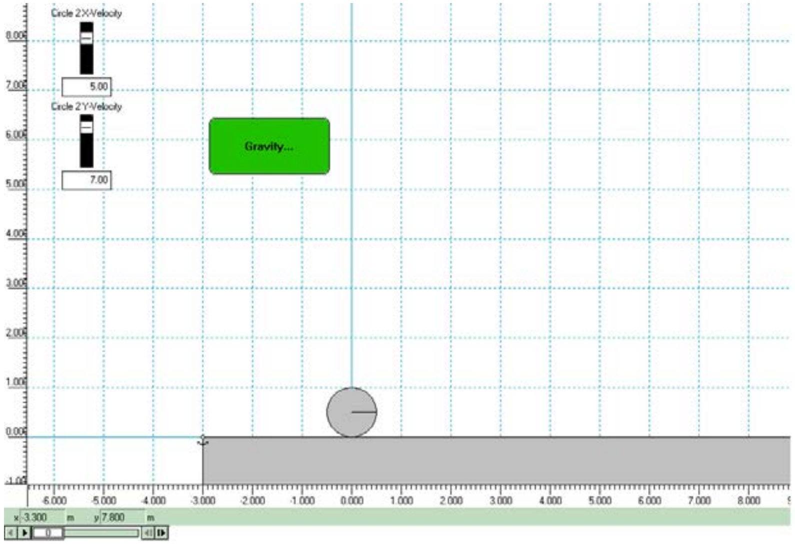


We used trigonometry to explore on the angle of release as a function of distance and CAD to see our new finds.

CAD as shown on excel

Conclusion


Circle 2 X-Velocity
0.00
Circle 2 Y-Velocity
7.00
Gravity...
x -3.600 m y 5.900 m


Circle 2 X-Velocity
5.00
Circle 2 Y-Velocity
7.00
Gravity...
x -3.300 m y 7.800 m

Conclusion

- In conclusion, our design performed very well. Once we found the correct power setting we were able to consistently launch the penny between 14 and 16 feet, although the accuracy was not always spot on. In response to some of our test we had to modify our design, which left us with a machine that was fairly different from what we at first expected. Overall, our design performed up to our expectations.