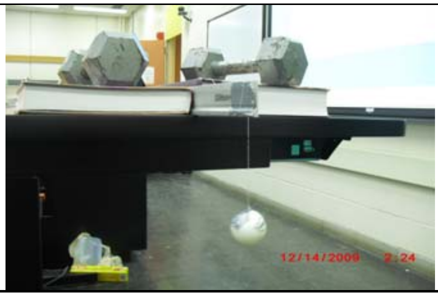
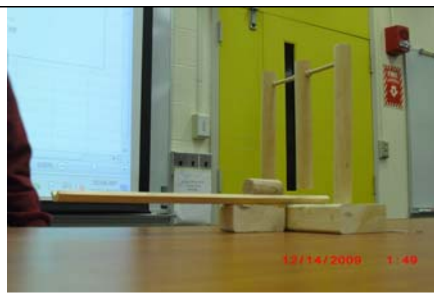
Engin 103 October 14, 2010 back to e-syllabus	Topics: Project 1 -Part I Presentations Logbook questions

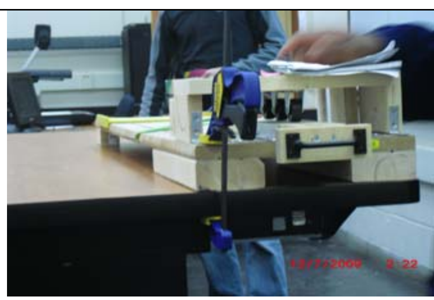
Project 1 Part I Presentations: Design for System Predictability

Project 1 leaders: please copy this page and fill in your team response below. Then save as a web page: name “p1p1.html” and upload to your ftp *files* folder.

Section 1 (9:30 AM)

Team #	Picture of system *If you took a picture of the system you can insert it here, otherwise leave it blank, we will take care of it.	a) System name b) What are the input X and output Y along with their units	c) How did your design make sure the system can produce at least 10 pairs of distinctive values for X and Y d) How did your design reduce to a minimum any uncertainty in the system so to increase its predictability	e) What mathematical models may work for this system using the Spreadsheet? f) Which model you think will best describe the system, why?
1 section 1				

2 section 1				
3 section 1		a) 21st-Century Slingshot b) X = distance slingshot is pulled back Y = distance the projectile traveled	c) We decided a simple slingshot was an easy way to produce an unlimited amount X,Y data. d) We used sanded wood and smooth metal projectiles to ensure a reduction in friction for accuracy. The more accurate the data, the better the model. And with a good model comes better predictability.	e) We determined that a quadratic and also a cubic model work best for our system. Both models have almost the same S parameter, so both are equally well-suited to use for predictions. f) Although both models are virtually the same, we decided to go with the quadratic one best solely on simplicity. The less coefficients in the model, the less confusing it would be, and the easier it would be to predict Y' values
4 section 1		**Cork bumper** **X: height of bumper** Y: distance of cork	We gave the bumper and the track a certain range of height and distance We used the same types of wood for the whole system so it will have the same coefficient for friction, and we used rubber bands to keep the bumper in the same position	The liner and quadratic models The quadratic model because the data points should give a graph with a normal curve

5 section 1		The name of the system is The Ball Chute Input X is the distance in cm from the base of the system. The initial base piece has a series of 9 extensions to add values of X. Output Y is the distance from the mouth of the system that the ball travels before making contact with the floor.	c) Initially, our conception for predictability was to examine ways to avoid a system with any complex mechanism. This was in order to minimize variability. We decided that we wanted to find a way to rely on gravity alone. However, we eventually discovered that Gravity alone can create its own difficulties. d) Because our system was too steep, the length of the system created too much momentum for the input to make a controlled ejection from the system. Our solution was to reduce the lengths of the extensions. The range needed to be less than 100 cm. in total. Our range is 17.5 cm to 95.5 cm. The sea set of extensions to the system establishes 10 inputs. In addition, the system requires further modification. At present we will include instructions to indicate that the input must be loaded into the system in a manner that will allow it to roll the entire length of the system, otherwise predictability will not be maintained. We are in the process of designing another prototype, but we are not certain it will be ready for final presentation on October 18.	e) It seems as though excel can use any of the equations to account for changes in velocity caused by rolling friction, the curve of the system at ejection, and the arc of the balls flight reflecting momentum versus gravity. f) A quadratic equation is most likely because the two main variables will be the momentum created by gravity while the ball is rolling (this is to account for friction) and the velocity created by the curve at the base of the system during the ejection of the input.
6 section 1		**a) The name of the system is “Input Outpuck”** **b) Input (X) is centimeters the hammer is pulled back**	c) The system design has a domain for (X) of 0-12 cm, with different outputs (Y) for every half centimeter starting from 3 cms. Thus, we can test at least ten distinctive values of X to	e) Using the spreadsheet, it is possible that any one of the three models we’ve discussed in class can model this system. Linear, Quadratic, or Cubic. f) Judging from the classworks we have done, it seemed that the quadratic model

		Output (Y) is inches the puck travels from rest	give at least ten distinctive Y values d) To reduce the uncertainty, first we added housing to keep the hammer from unwanted horizontal movement. Next, we added wheels to prevent unwanted vertical movement. From there, we added a layer to the top of the hammer and an additional wheel to further minimize vertical movement. We also switched from bungee cord to elastic bands to get more consistent results, therefore increasing predictability.	best represented the systems. However, with some crude data, it appears as though the cubic equation may best represent "Input Outpuck."
7 section 1				
8 section 1				
9 section 1				
10 section 1				

Section 2 (2:00 PM)

Team #	Picture of system *If you took a picture of the system you can insert it here, otherwise leave it blank, we will take care of it.	a) System name b) What are the input X and output Y along with their units	c) How did your design make sure the system can produce at least 10 pairs of distinctive values for X and Y d) How did your design reduce to a minimum any uncertainty in the system so to increase its predictability	e) What mathematical models may work for this system using the Spreadsheet? f) Which model you think will best describe the system, why?
1 section 2		(g) Mouse-a-pult (h) Input is how far back the system is pulled. 90 degrees or 150 degrees. And the output is how far away the quarter lands in feet.	(i) We recorded 10 attempts by pulling back the system to a 90 degree angle and another 10 attempts at 150 degrees. (j) Actually our design did not reduce any uncertainties. There is a huge area of human error	(k) Linear (l) I think linear would because the more you pull back the farther it should go. And it does go farther you pull back according to our data.
2 section 2				
3 section 2		g) Mousetrap Car h) X = distance the trap was pulled back from start in degrees. Y = distance car traveled	i) We just had to make sure we had enough room to where the car wouldn't hit an obstruction. j) We put rubber over the wheels to make the car	k) We believe all the models will work. l) The quadratic because there is not a straight correlation and there is not enough

			in inches.	have more grip.	discrepancies in the data for the need of the cubic model.	
	4 section 2					
	5 section 2		a) "Team 5 Launcher" b) X and Y values are measured in inches	c) We made the angled piece of wood longer to fit more X values. We started with 10- X values on a shorter piece of wood, but made it longer to get more readings d) We used a tube opposed to an open track design. The open track had more human error which lead to unpredictability	e) So far the linear and quadratic formulas looked good in excel on the curve fitting. f) I think Quadratic formula would work best for our system. I did not see a linear correlation between the value of our X input and our Y output.	

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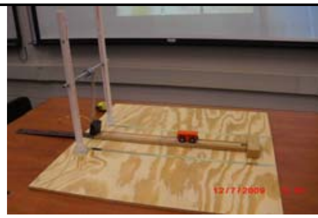
<td><u>6</u> section 2</td>
<td></td>
<td>JJES Hammer
Input X = How high the hammer is lifted
Output Y = How far the object travels</td>
<td>i) X is the height of the block raised back and Y is the distance the car travels.
j) we attached a string to the block so we can determine the raise of the block.</td>
<td>k) quadratic equations
l) Pendulum because it swings back and forth.</td>
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<td><u>7</u> section 2</td>
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<table>
<tr><th>Length pulled down (X) in cm</th><th>Distance traveled (Y) in cm</th></tr>
<tr><td>0</td><td>0</td></tr>
<tr><td>2.9</td><td>48.00</td></tr>
<tr><td>5.8</td><td>81.20</td></tr>
<tr><td>8.7</td><td>108.20</td></tr>
<tr><td>11.6</td><td>144.10</td></tr>
<tr><td>14.5</td><td>183.00</td></tr>
<tr><td>17.4</td><td>207.20</td></tr>
<tr><td>20.3</td><td>250.30</td></tr>
<tr><td>23.2</td><td>320.10</td></tr>
<tr><td>26.1</td><td>354.20</td></tr>
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<td>-How the design can produce 10 XY values?
It can produce distinct values because the string was measured accurately. When string is pulled down to any length, the tension is increased accordingly on the mousetrap and the rubber band. Because the mousetrap and rubber band are products with consistent tension, the distance that the paper ball travels will be consistent depending on the length the string is pulled back.
-How the design, reduced uncertainty of system/increased predictability?
Constant interval along the string reduces uncertainty in the system. The double-sided tape, adhered to the bottom of the catapult, ensures that it will stay in place upon pulling the string. The plastic pipe at the top of the arm is cut down to a height that will have minimal interference with the ball when launched. And as we said before, the mousetrap and the rubber band are both products with consistent tension.</td>
<td>- What Mathematical Models might work for the catapult?
This is similar to the pendulum, which we had performed in class, so therefore we believe it is Quadratic.</td>
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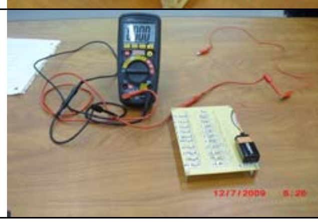
8 section 2		g) Series Circuit h) Input X = the # of bulb(s) in integer. Output Y= the amount of voltage (v).	i) We can add an infinite amount of X (bulbs) and still be able to produce Y but it will be very minute. j) Our system do not contain human intervention so there are no human errors. The measuring instrument is also digital.	k) The linear, quadratic, and cubic equations may work for this system. l) The cubic equation may best describe the system. It contains the most coefficients to gain higher precision.
9 section 2				
10 section 2				

Report for team #			
Submitted		On time	Late
Uploaded electronic copy		Yes	No
Project 1 web page		Yes	No
Team participation table		Yes	No
Report submitted (80)	Progress Report: p1pr.html (5)		
	p1p1.html (5)		
	p1p2.html (5)		
	Introduction (10)		
	Design/Building (25)		
	Analysis: Spreadsheets (20)		
	Conclusions (10)		
Good writing practices (20)	Grammar and presentation (5)		
	Logical arguments and structures (5)		
	Accurate, completeness; non-plagiarism (10)		
Deduction			
Project report total (100)			
Project presentation total (200)		Performance and Design (180):	
		Web pages Parts I and II (20):	
Project 1 total (300)			

Section 1

Project 1 -part I P&D/ Teams	1	2	3	4	5	6	7	8	9	10
14-Oct-10	Pendulum	Ball on Ramp	21st Century Slingshot	Cork Bumper	Ball Chute	Input Outpuck	Catapult	Air Canon		
Project completed (35)	35	35	35	35	35	35	35	35		
Design for predictability (15)	13	12	15	15	12	15	13	12		
Performance& readiness (25)	20	19	23	25	21	25	21	21		
Presentation (15)	15	15	15	15	15	15	15	15		
Total part I P&D (90)	83	81	88	90	83	90	84	83	0	0

Section 2

Project 1 -part I P&D/ Teams	1	2	3	4	5	6	7	8	9	10
14-Oct-10	Mouse-a-pult	Car	Mousestr ap Car	Catapult	Tall Launcher	JJES Hammer	Catapult	Series Circuit	Catapult	Circuit
Project completed (35)	35	35	35	35	35	35	35	35	35	35
Design for predictability (15)	11	13	13	13	14	14	14	15	14	15
Performance& readiness (25)	20	24	23	23	25	24	25	25	24	24
Presentation (15)	15	15	15	15	15	15	15	15	15	15
Total part I P&D (90)	81	87	86	86	89	88	89	90	88	89

Project 1 -part II P&D/ Teams	1	2	3	4	5	6	7	8	10
Project completed (35)									
Spreadsheet and data modeling (15)									
System predictability (25)									
Presentation (15)									
Total part I P&D (90)									

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LOGBOOK: example of a logbook page

-Use a quadrille notebook; number all pages; date all entries
-Write your notes for all activities, thoughts, problems and solutions, and learning conclusions related to Engin 103. You should write down progress, outcomes, and conclusions on projects and teamwork; conclusions from class work (including LabVIEW) and homework.
-In addition you should answer in the logbook all questions listed in these notes in blue, as shown below:

25) Sketch the system built by your team, describe the input and output variables on the sketch. What units will you measure these variables, and with what instruments.

26) Explain with a sketch the different design elements your team used to increase predictability. Explain what mathematical model will be the best to describe the system using the X and Y variables mentioned in the previous question.

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