Jerkling-Final Presentation

A Better Speed Bump that Saves Energy

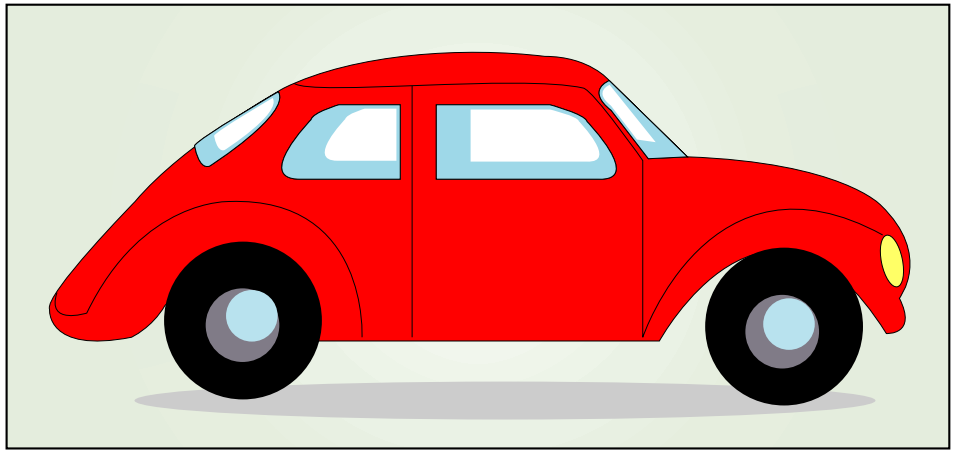
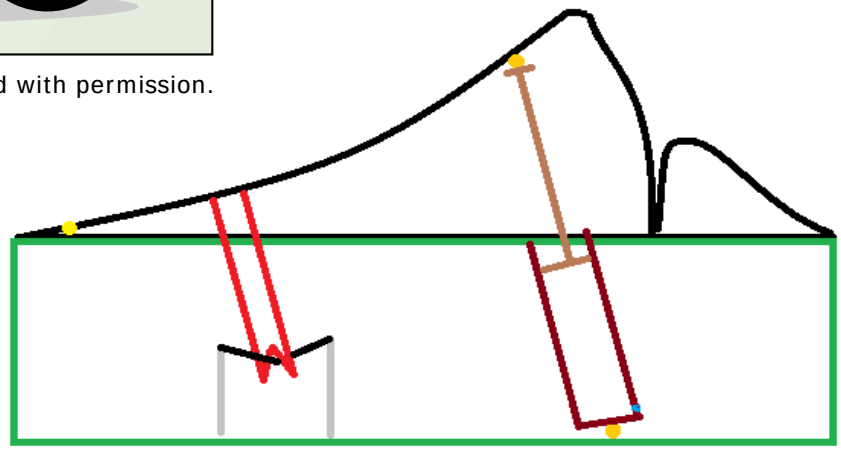
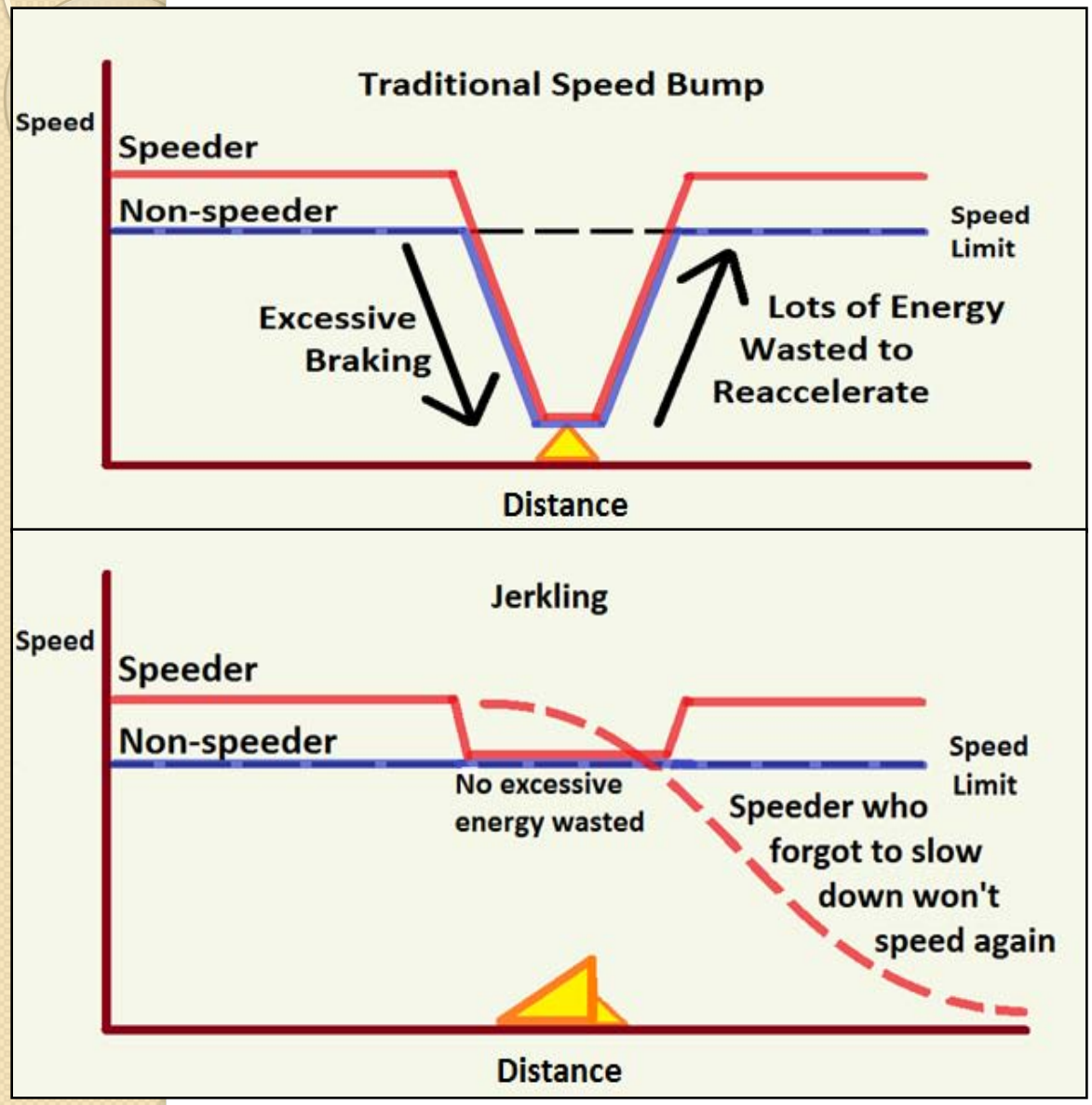


Image courtesy of MIT OpenCourseWare. Used with permission.



Motivation: Saving Energy



- Traditional speed bumps waste energy as drivers brake and reaccelerate.
- Jerkling prevents braking and reaccelerating by letting vehicles pass over at the speed limit. Speeding at high rates will cause significant discomfort and/or damage

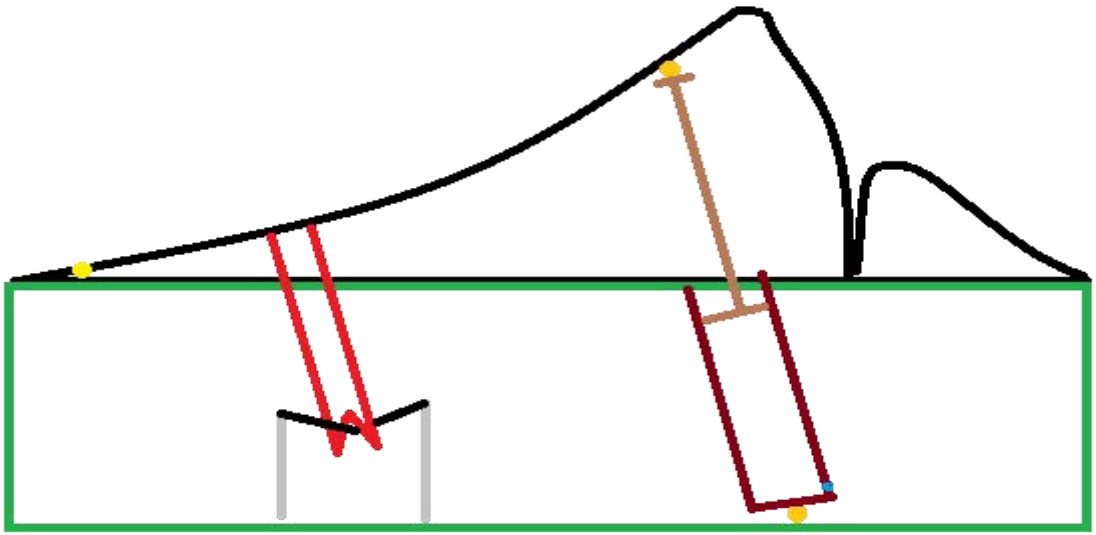
Existing Solutions

- All speed bumps essentially are a bump, but the geometries are different.
- Conventional speed bumps (like the ones on Dorm Row)
- (Left) Speed Cushion
- (Top) Speed Table
- (Bottom) Speed Humps (like the one in front of Simmons)

Courtesy of Richard Drdul. Used with permission.

Speed cushion - Wikipedia, the free encyclopedia, http://en.wikipedia.org/wiki/Speed_cushion.
Speed table - Wikipedia, the free encyclopedia, http://en.wikipedia.org/wiki/Speed_table.
Speed hump - Wikipedia, the free encyclopedia, http://en.wikipedia.org/wiki/Speed_hump.

Jerkling's Design



Basics

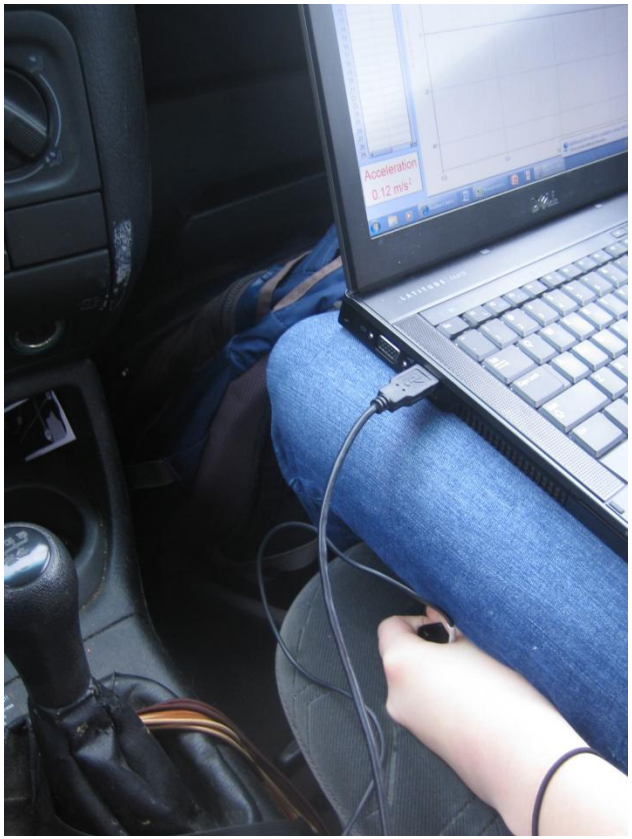
- A Dynamic Speed Bump
- Ramp
- Dashpot
- Elastic Component

Testing the Speed Bumps

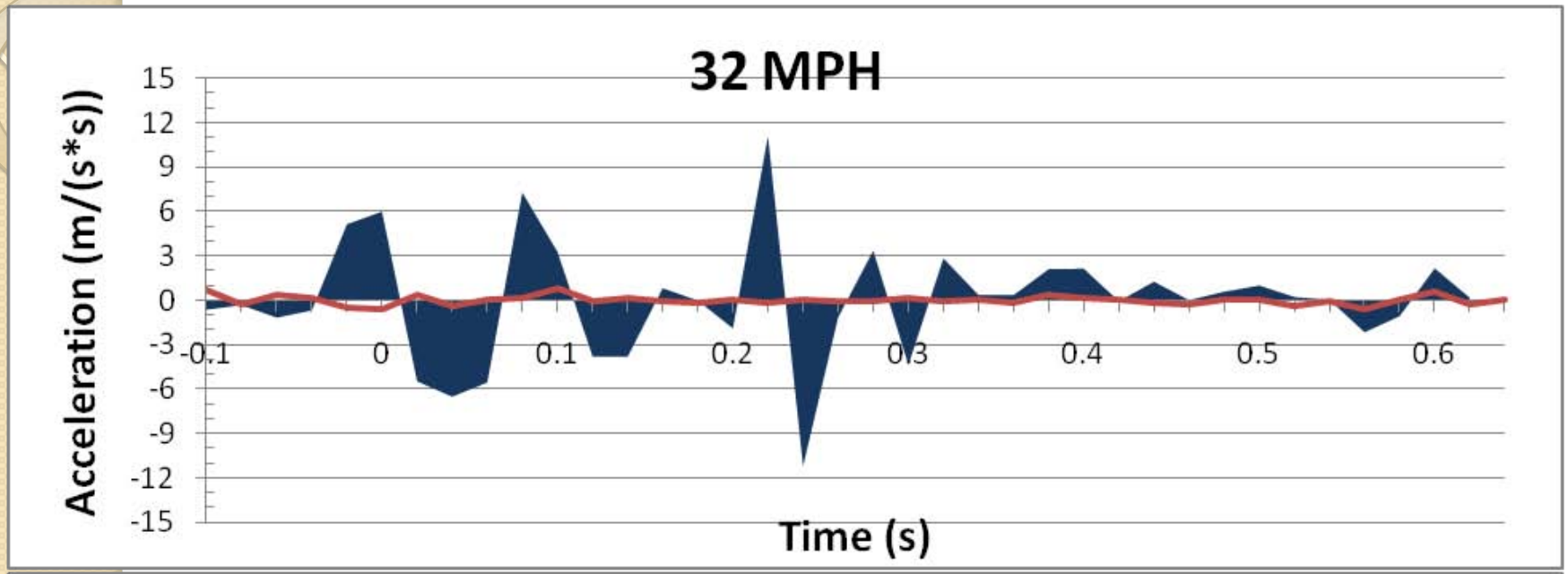
- We used an accelerometer to test the acceleration of the car when driven over speed bumps.
- We traveled along Dorm Row (Memorial Drive) and in front of Simmons (Vassar Street)

Baker Speed Bump 33 MPH

Testing the Speed Bumps



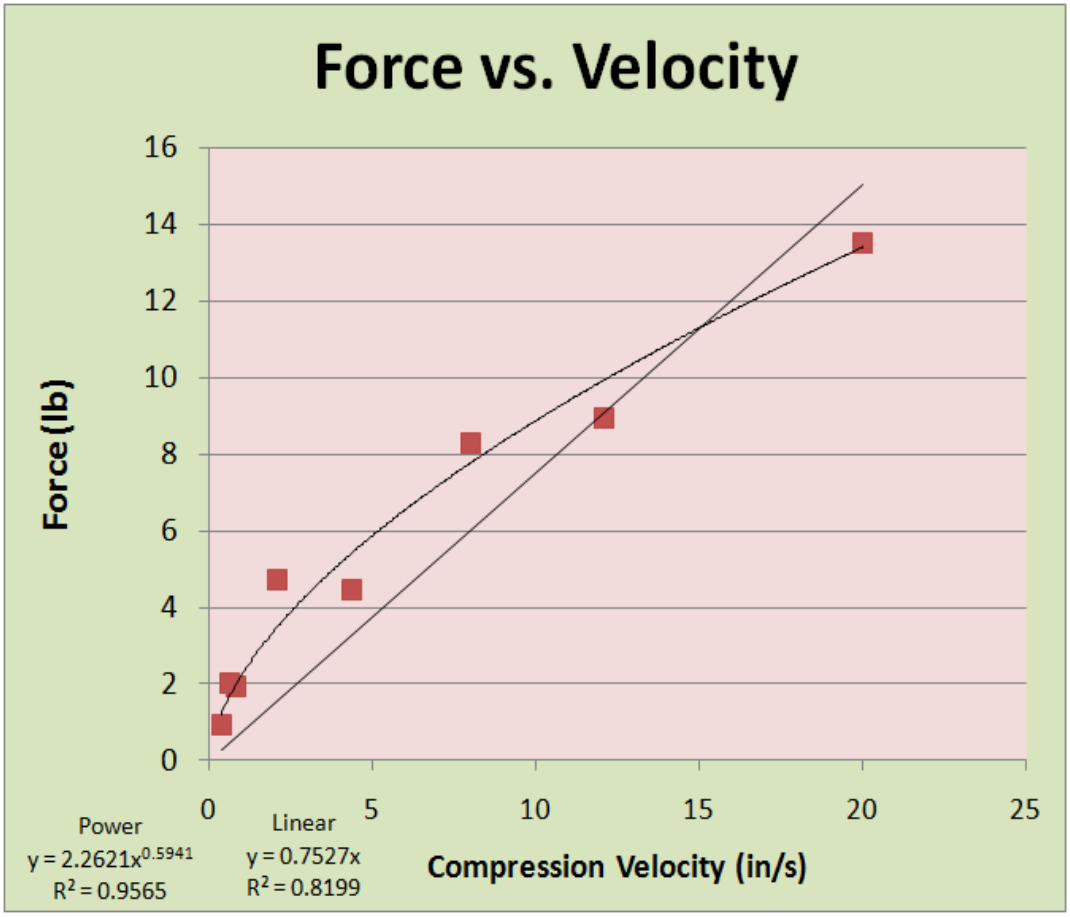
The Data


32 MPH
Acceleration (m/(s*s))
15
12
9
6
3
0
-3
-6
-9
-12
-15
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
Time (s)


15 MPH
Acceleration (m/(s*s))
15
12
9
6
3
0
-3
-6
-9
-12
-15
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
Time (s)

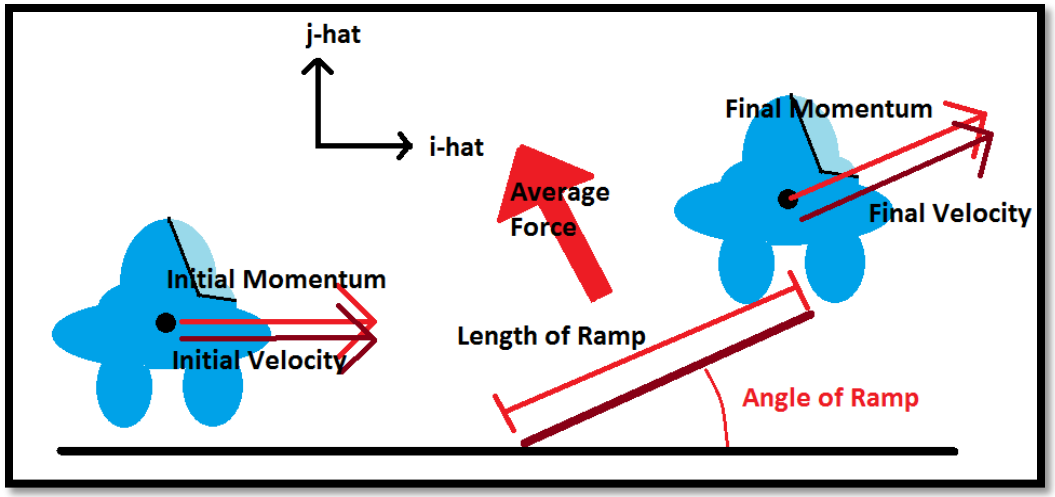
Testing the Dashpot

- Showed F α v
- However, friction and wobbling distort this relationship



Modeling Jerkling-Making Sense of Data

- The angle in which the car takes off after hitting the speed bump is quite low.
- This helps to understand speed bumps



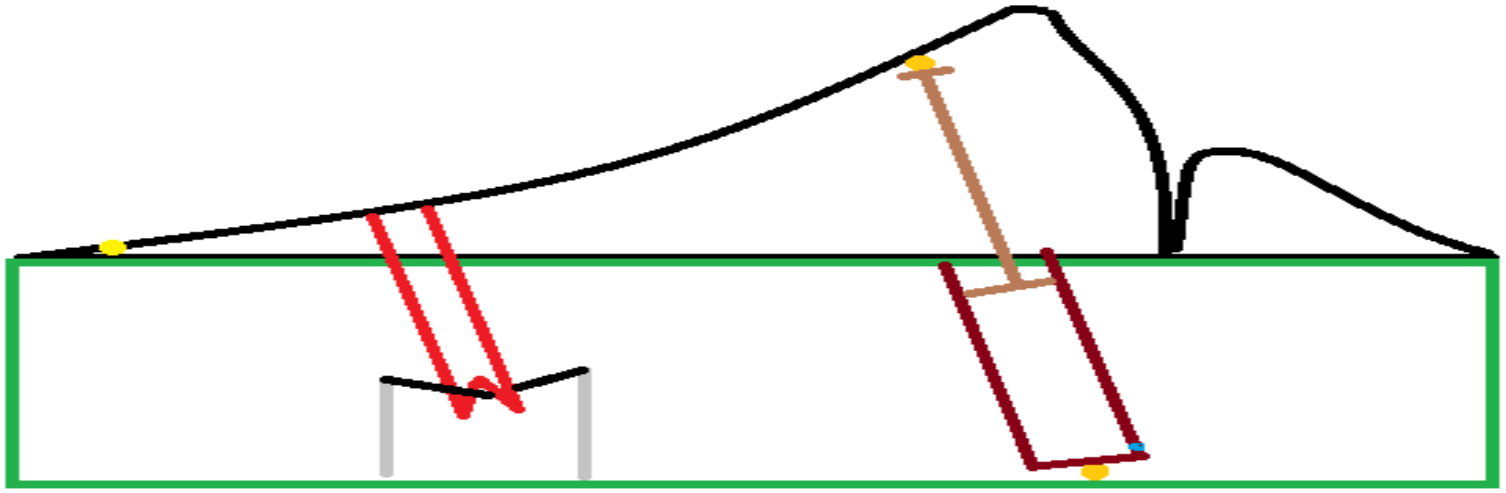
Final Angles | MPH	15	25	32	40
Final Angle from data	0.88	0.53	0.42	0.49
Final Angle from Model	2.0	1.2	0.7	0.6

Jerkling: What does this mean

- Little discomfort was felt during trials
- The force caused by the speed bump is about the same as the force caused by landing
- Dashpots do have a resistive force proportional to compression velocity
- The angle of speed bumps is very low
- The design should be…

Elongated!

Initially hitting the speed bump won't hurt; just the landing.



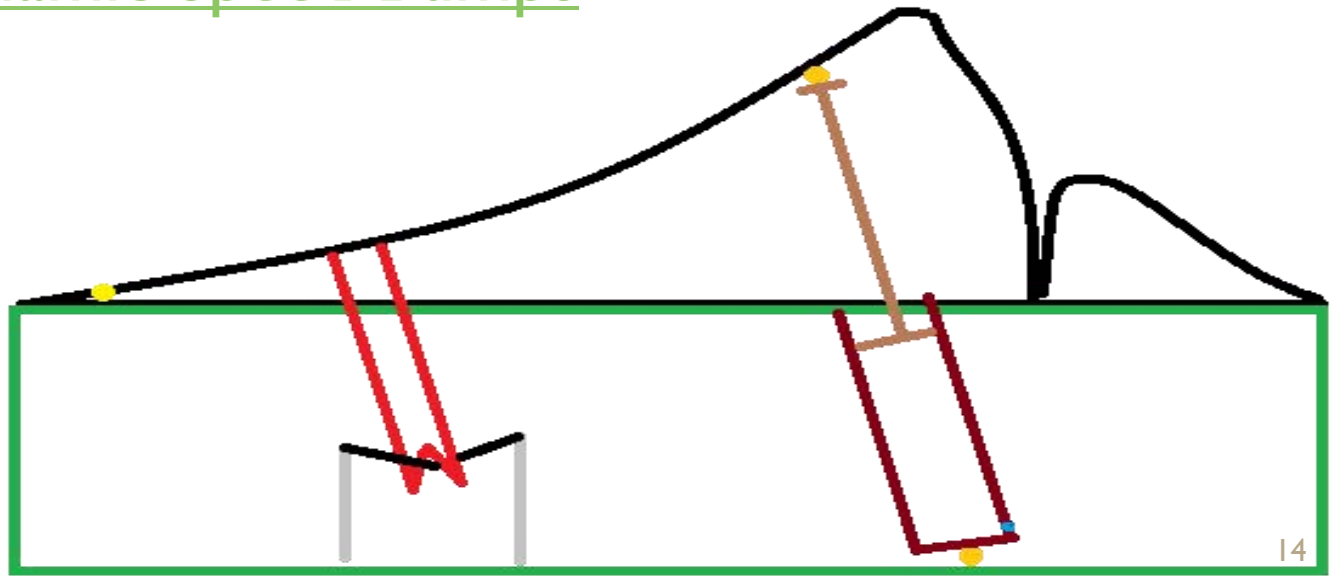
- The visual impact of Jerkling will be effective at keeping vehicles within the speed limit.
- Vehicles will be able to travel over Jerkling at the speed limit easily, and hence this will save energy.

Energy Saved

- Assumptions: 20 MPH difference, 100 cars an hour, reacceleration distance = .01 miles, and Gallon of gas = $2
- Cost of going over a speed bump then is 1 penny.
- In a year, the speed bump would save over 400 gallons of gas.

Thank you for your attention!

- Questions
- Comments
- Links:
  - Camera Solution
  - Dynamic Speed Bumps



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