The Power of Water and the Conservation of Energy

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Every year the American Society of Mechanical Engineers hosts a competition where schools from all over are given a task and have to design a device that will accomplish that task. This year the ASME competition was called "H2GO: The Untapped Energy Source?" In a time of ever increasing energy cost, students were tasked with finding a feasible way to convert the energy from falling rain into a usable form of energy to power a car. For the competition 1 liter of water will be dropped from 1 meter in height. Students must capture as much energy as possible from the falling water and use that energy to propel a car as far as possible across an unknown surface that will be specified prior to the start of the competition. In addition to converting the energy from the falling water, the students must also figure out how to contain the water and prevent it from going everywhere. The winning team will have the car that goes the farthest distance summed together from the two test runs. One point will be awarded for every millimeter the car travels. Points will be deducted for every milliliter of water, over 25 milliliters, spilled. The students also had strict guidelines about the size of the device and car that they could possible design. The falling water is to be the only source of energy in the competition.

In our design we wanted to have a two step energy conversion process. Our design incorporated the use of a water wheel to capture the energy from the falling water as well as a spring to store energy to be used while the car is in motion. We had the water fall onto a waterwheel which, after some reduction to slow down the speed and produce more torque, wound up a weighted pendulum. After the pendulum reached a predetermined height, a quick release mechanism would release the pendulum, sending it into free fall where it would collide with the back of the car and kick the car out of our device. While the pendulum is being wound up, a spring on the car is also being wound up from the main shaft of the water wheel through gearing on the car. After the car has left the device and started its forward motion the spring would start to unwind giving it more energy to go farther. The water will be captured in a box that is constructed around the waterwheel to minimize splashing and will be poured out of the device after the test run is complete.