Physics on Steroids
how to give your physics students
a shot in the arm

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Abstract: I like to define undergraduate research as asking interesting questions and finding answers to those questions. Video analysis is one of the most economical and flexible experimental techniques to enable students to do undergraduate research, starting with introductory physics and continuing to advanced mechanics. Particular features of Tracker—a free cross-platform, open-source video analysis application—allow students to easily change reference frames, compensate for panning and zooming of a camera, auto-track objects, and test a numerical model. Computational modeling, using tools such as Easy Java Simulations and VPython, allow introductory students to solve problems numerically so that they can compare predictions from theoretical models to experimental results. Student projects will be demonstrated, with an emphasis on the benefit of undergraduate research in the freshman and sophomore years. If you want to hook students on the excitement of independent discovery with a budget of $300 or less (for a camera), then video analysis and computational modeling are for you.

Aaron teaches at High Point University. He came to High Point in 2002 as their first tenure-track physics professor. In 2010, High Point University began offering B.S. and B.A. degrees and in 2012 had their first physics graduates. Aarons interests are undergraduate research and technology in teaching. He co-developed WebAssign with Larry Martin in 1997, and recently he co-wrote the solutions manual for the 3rd edition of Matter and Interactions. In 2012, he was nominated as the Four-Year College Representative for the Executive Board of AAPT. He likes trying new things in the classroom and believes that teaching is ultimately an experimental discipline.