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Putting Humans to "Work": Generating Usable Electricity from Wasted Energy

In response to the growing energy crisis, this project was designed to examine the small scale generation of electricity from daily activities. A prototype step that translates the gravitational potential energy of a person walking down a stair into usable electricity was designed and built in order to investigate the plausibility of this method of generation. The stair was built with four main systems: a general structure, a return system that utilizes springs, a generation system that uses a rack and pinion gear apparatus to translate the linear motion into rotational motion for generating electricity, and an energy usage system that converts the electricity generated to either direct or alternating current. Once these systems were designed and installed, testing of the stair was done to measure the voltage, current, and time of each step, which in turn was used to calculate the energy generated. The data collected showed significant amounts of electricity were generated by the stair. Through testing of revision four, an average of 2.95 joules were produced per step. A maximum of 15.05 joules per step were generated, showing that a more consistent stair could possibly generate significant amounts of electricity through large amounts of use. These results support the plausibility of the generation of appreciable amounts of electricity in large human foot traffic areas such as transit stations or stadiums. Results from revision four suggest that there is further room for improvement; the overall efficiency of the system can be greatly increased in future revisions.