

**Gravity Powered Light**  
(Technical Report)

**A Duty Ethics Analysis of the use of the CRISPR-Cas9 Gene Editing Technology on Twin  
Embryos in China, 2018**  
(STS Research Paper)

An Undergraduate Thesis Portfolio

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## Socio-technical Synthesis: Gravity Powered Light and CRISPR-Cas9 Gene Editing

My STS research paper and technical project have helped me in understanding the importance of engineering responsibly in the face of climate change and population growth. My technical project, a gravity powered light, provides energy from sustainable means. This is becoming more important as we continue to deplete natural resources and pollute our environment. My STS research paper explores the ethicality of a gene-editing technology that could artificially alter the human genome for generations to come. In my technical project I take a proactive approach of designing responsibly within the context of our society while in my STS research paper I discuss the dangers of not doing so.

My technical work discusses the design of a gravity powered light meant for camping/hiking applications. The device is secured around a tree where a user can hang a backpack, water bottles, or any extra gear that is not needed at the time. The potential energy created from this lifted weight is transferred to kinetic and then electrical energy via a gearbox as the weight descends. A mechanically disadvantaged gearbox allows the weight to fall slowly while spinning a motor much faster. This motor powers several LED lights attached to the outside of the device which can be used to illuminate a campsite.

My STS research paper explores the ethicality of Dr. He Jiankui's operation on a human embryo with the CRISPR-Cas9 gene editing device. I argue that his actions were unethical according to the framework of Kantian duty ethics. Jiankui risked setting a standard of disregarding guidelines for scientific research that could put children of future generations at risk. He also treated people unequally by denying their right to make rational decisions and endangering the lives of others. Lastly, Jiankui treated humanity as a means to his selfish desires

for fame. These three principles are the foundation of what Immanuel Kant describes as the “categorical imperative” in determining the morality of an action.

Although my technical project and STS research paper are not closely related, working on both in tandem has helped me to understand the importance of designing within the context of society. My STS research helped me to understand the possible implications of designing a technology without the proper regulations in place to make it safe. My technical work showed the value in creating a device that addresses a problem our society faces. These two projects together increased my awareness for the possible implications of a new invention and the importance of considering contextual factors during the engineering process.