

Honors Assignment: Engineering the Tools of Scientific Discovery

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Scientific discovery has eternally been the lifeblood of human progress. As humanity begins to understand itself, its Earth, and its universe, a world will shape where people will not just survive but thrive. Imagine a society where the human body and disease are understood, where realistically sustainable practices abound, and where the world no longer lives in suspicion of the unknown: a fulfilled society crafted by knowledge. As scientists and thinkers have questions, it is the calling of the engineers, the makers, to conceive a way to answer them. Engineers collaborating with their brethren scientists and illuminating the path of knowledge through creating the tools of scientific discovery is their most critical challenge of the 21st century.

Science is defined by the Science Council as “...the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence.” (Our Definition of Science - The Science Council ~, 2020). The comprehension of our world is considerably dependent on this wonderfully complex field. A world without science is one of ridicule - diseases ‘cured’ by leeches and fear of falling off the edge of a flat Earth. It is not only a correlation between the advancement of society and new scientific discoveries but causation. But how did scientists discover bacteria, or how did they understand the spherical nature of Earth? The answer - through tools that engineers fashioned.

As early as the Stone Age, humans were fabricating solutions to problems - flint for fire and spears for hunting. Today, these people are dubbed engineers. The realms of science and engineering are simultaneously coexistent yet worlds apart. In her exploration of these unique yet interconnected fields, Dr. Sunny Auyang concludes that scientists and engineers operate within a unique ecosystem. The role of engineering is to supply instruments and technology to scientists.

The scientists then share their discoveries with the engineers to improve that technology, which leads to the discovery of new knowledge (Auyung, 2005). Within this complementary cycle, engineers face numerous challenges in their role to drive discoveries forward.

The challenge of Creating New Tools for Scientific Discovery is 'grand' for a reason. Science is inherently uncertain, but how are engineers supposed to create a tool for something that is not defined? Then, once the idea for a tool solidifies, creating the technology to make observations of processes that typically cannot be explicitly sensed by humans is a feat in and of itself. From the perspective of an intended physical science and engineering double major, the marriage of these two disciplines is a symbiotic relationship with boundless potential. Meteorology is one scientific field of interest that would not exist without engineering - radar, weather satellites, computer programs, and countless other engineered tools drive the study of the Earth's atmosphere. The interest for this Grand Challenge stems greatly from the endless possibilities in countless disciplines and from the unique ecosystem of discovery that it generates.

Each Grand Challenge of Engineering is vital to the sustainability, health, safety, and joy of living of humanity. However, Engineering Tools for Scientific Discovery has the potential to be pivotal in the course of humanity both in this world and millions of light years away. As engineering allows scientists to discover new knowledge, perhaps humanity will advance beyond anything presently imaginable.

References

Auyung, S. (2005, October 13). *Complementarity in science and engineering*. Creating technologies. Retrieved October 1, 2023, from <https://www.creatingtechnology.org/eng/complement.htm>

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