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INTRODUCTION

This book is about presenting electrical engineering information and activities in the classroom for students to use and ponder. Teachers and higher educators can use this book as part of the regular academic day; in conjunction with STEM/STEAM, or technology education classes; or even for after school clubs, or special academic projects. They can also supplement classroom discussions about electricity.

The impact of electrical engineering accomplishments spans a wide array of our economy—from common electronic devices and electric power systems to renewable energy sources, to electromagnetic fields, to artificial intelligence. Let's not forget robotic devices, space travel and electric vehicles—just a few electrical engineering application areas. This small volume attempts to create some broad-based familiarity with this form of engineering.

Because of the intimate use of computer engineering/science within electrical engineering, many engineering colleges have renamed their electrical engineering departments as “electrical and computer engineering,” or something similar. Combining the two is a natural aspect of engineering, where the fields are becoming more hybrid. As an example, at the turn of the past century, circa 1905 or so, five engineering fields—electrical, mechanical, chemical, civil and industrial had been clearly defined. Today, however, more than 100 titled fields—including aeronautical, ceramic, aerospace, solar, oceanic and automotive make up engineering. Engineering encompasses a large world; and electrical engineering is a heavy slice of that world, often touching humanity in some way, every day.

With the wide sampling of activities presented here, teachers can develop lesson plans, or special projects, for students to research and share with classmates. These activities are meant to provide barebones suggestions teachers can use to explore the areas identified. So, let some teachers know about this little volume. And perhaps, you can stop by the classroom and help them out. Be an expert visitor—talk with the students—and answer their questions. They are eager to explore!

~Harry T. Roman

EDUCATION

Becoming an engineer is a tough, integrated curriculum, with many technical and humanities courses. Use this section to introduce your students to the profession; and show them what they can expect, if they decide to pursue an engineering career. Below are some broad initial activities to pursue:

- Develop a definition of electrical engineering. Research the Internet and other relevant documentation and information. Visit a variety of engineering schools, professional organizations and websites.
- While researching the definition of electrical engineering, take time to examine some classical definitions of engineering. Explore how it has changed over the past two centuries.
- Identify 10 national colleges that offer electrical engineering degrees. Is there a commonality among these schools and their degree programs?
- When did electrical engineering exist as a formal field of study? How many different types of electrical engineering areas now exist?
- Check out several nearby engineering schools, and see what courses they offer in the electrical engineering curriculum. Determine what types of courses educators at these institutions teach electrical engineering students. How do these courses vary by type of electrical engineering specialties offered?
- Invite several electrical engineering students to your class to discuss what (and how) university-level educators teach them. Have them discuss the importance of the classes students take in high school.
- Why do engineers study the humanities, economics and environmental issues? How does this impact what they design and implement?
- How do electrical engineers solve problems? What is the general process they use to start with a design or problem, and then proceed to a solution? Is this process different, or similar, to what all engineers do?
- Why do engineering students study and apply computer technology?

- Why is math so important to engineers?
- Construct a timeline of great electrical engineering accomplishments over the past 150 years.
- Engineers keep notebooks of their designs, projects and inventions—why?
- What are patents? Why are they so important?
- What are codes and standards? Why are they important to engineers?