An Innovative Approach To Engineering Outreach

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Abstract

This paper describes an engineering outreach web page that was developed to aid high school students and others interested in engineering as a possible career. The page draws on input from engineers, engineering students and non-engineering students, and provides, in an informal and entertaining style, information about engineering, its various disciplines, education options and resources, engineering societies, employment resources, and representative engineering student projects. This approach to outreach takes advantage of modern computer media technology and is more efficient than traditional outreach activities.

Introduction

The internet has become a useful resource. In a matter of minutes, one can find information on just about any subject. As personal computers continue to find their way into more and more homes and businesses, the internet is expected to play an increasing role as a source of news and information.

With the growing need for engineers in the twenty-first century, outreach activities are becoming more important. Traditional outreach activities consist of university faculty visiting and speaking with high school students. These methods are effective, but not very efficient. To attract students to important areas of engineering in an effective and efficient manner, universities must make full use of today's computer media technology.

This paper describes the development of an engineering outreach internet site at the University of South Florida. This informational site is aimed at introducing high school students and others to engineering. The development of the web page has incorporated a unique mix of perspectives from engineering professionals as well as engineering and non-engineering students.

Input from engineering professionals is essential because they know the directions technology is taking and where tomorrow's challenges lie. It is their responsibility to not only move forward with their own research activity, to disseminate findings to peers, and to incorporate research into their engineering courses, but they must also pass on their fascination with engineering to those who are now planning their careers.

Input from engineering students is necessary as well because they are currently going through the whole engineering education process including co-op experiences, and they can reflect on their own recent experiences which led them to choosing engineering for a career. Input from individuals without any engineering background has helped make the web site more appealing to the general public. Engineering can be very exciting, but engineers often do get enthusiastic about things that the general public would find uninteresting.

Description of Web Page

The Engineering Outreach web page URL is

http://www.eng.usf.edu/ME/hs_nsf/index.html

The web page uses a series of elementary yet relevant questions beginning with:

What is the Engineering Outreach Page?
What is the goal of this page?

The Engineering Outreach page is a web page for high school students and others who are interested in careers in engineering or who are interested in just a concise overview of the field of engineering in general.

The goal of the page is to provide those interested in engineering with answers to the following questions:

1) What is engineering?
2) What types of things do engineers do?
3) Is a career in engineering for me?
4) What are the different areas of engineering?
5) What types of engineering degrees are there?
6) What schools have engineering programs?
7) What are typical salaries for engineers?
8) What is a co-op program?
9) What kind of engineering student design projects have been done at USF?
10) What are the benefits to joining engineering societies?

The page makes ample use of graphics and some humor to keep ones interest. For example, question three is answered by the following:

Engineering may be for you if:

1) You're always taking things apart to see how they work.
2) You are fascinated with cars, planes, electronics, machines or structures.
3) You found (and possibly still do find) playing with an erector set to be an exciting way to spend the day.
4) You actually used that chemistry set your parents gave you.
5) You didn't shock yourself too much with your 1001 Electrical Devices kit.
6) You want to make a tangible contribution to society and make the world a better place.
7) You did or are doing well in math and science.
8) You want to find meaningful and gainful (i.e., $$) employment after college graduation.
9) You are a creative and innovative person.

Descriptions of the various fields within engineering are provided. To date, only the main fields in engineering such as chemical, civil, electrical, industrial, and mechanical engineering are included. Ample graphics are used to make these descriptions more interesting. We plan to enhance and update the web page every semester. Part of this effort will include expanding the number of engineering disciplines described in the web page.

In addition, the page describes the different types of degrees that can be obtained in engineering, and the type of positions one typically obtains with a particular degree. The difference between engineering science and engineering technology is also presented. This section is linked to a page of colleges and universities to directly allow students to examine specific engineering programs at many universities throughout the world.

Current salary data is included for the different engineering disciplines, education levels, and experience levels. A description and list of resources for co-op program employment opportunities is also given.

Representative student projects and resulting products from mechanical engineering design classes at USF are described. These projects help to give potential students a good idea of how innovative and useful engineering design can be. At USF, engineering design classes have designed and built human powered submarines, a tricycle and a swimming device for a young boy who is a quadra-amputee, and a hover-craft.

A brief discussion of the benefits of affiliation and participation with engineering societies is discussed. A list of several major engineering societies is given with links directly to their home pages.

As a source of more detailed information, a list of a couple good introduction to engineering type books [1-2] are referenced in the outreach page for those who would like to get more in depth information on the various aspects of engineering.

User Feedback

A brief survey has been developed to assess the usefulness of the engineering outreach page. The survey questions are as follows:

1) Select one of the following that best describes you: high school student, high school counselor, college student, other (please specify)
2) Was the Engineering Outreach Page useful to you? yes/no
3) Would you recommend the page to a friend who is interested in an engineering career? yes/no
4) What did you like most about the page?
5) What did you like least about the page?
6) What could be added to improve the page?

To date, approximately fifty students and several counselors from local high schools and colleges have responded to the survey. In general, users found the page to be useful, and would recommend it to friends. There was a fair amount of diversity in the responses to what was liked most and least about the page. The survey responses included a number of excellent comments for improving the outreach page. These include: 1) adding information on other engineering disciplines such as nuclear engineering and aerospace engineering, 2) adding information on how to choose a particular engineering school, and 3) adding information on scholarships and other financial support for potential engineering students.

Recently, the survey was added to the web page so that anyone using the page can respond electronically. The usefulness of this feature is expected to increase as the page becomes more advertised. In addition, a counter was added to monitor the number of people who use the page. However, since this counter was added only recently, no meaningful usage statistics are available at this time.

Summary

The outreach web site described in this paper has been developed over the last year with input from engineering and non-engineering students. It is planned to update the web page and its links regularly to incorporate current events and information. In addition to the web page's

survey, an e-mail address is given at the end of the page for users comments.

Future enhancements of the web page will also include: 1) information to promote interest in specific emerging areas of engineering and technology, 2) information on additional engineering disciplines, 3) information on additional engineering societies, 4) considerations for choosing a particular engineering school, and 5) information on scholarships and other financial support for potential engineering students.

Acknowledgment

The author gratefully acknowledges the support of the National Science Foundation under Grant Nos. CMS-9501824 and CMS-9629217, as well as the useful contributions from Greg Brookins, Dave Eller, Lisa Hess and Scott Tetzlaff.

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Dr. Hess is an Associate Professor of Mechanical Engineering and Director of the Dynamic Systems Laboratory at the University of South Florida in Tampa. He received his M.S. and Ph.D. in Mechanical Engineering in 1988 and 1991 from the State University of New York at Buffalo. In December 1996, Dr. Hess was honored at the White House with the National Science Foundation Presidential PECASE Award and designation of Presidential Faculty Fellow in recognition of major contributions to fundamental research addressing pervasive issues in the dynamics of mechanical and structural systems with friction. He has also received several education awards including the 1996 SAE Ralph R. Teetor Educational Award, the 1996 ASEE Southeastern Section Outstanding Teaching Award, the 1995 State of Florida TIP Award, and the 1995 USF Outstanding Undergraduate Teaching Award. He has an active research program in the areas of dynamics and tribology with significant funding from both government and industry.