

## Project Year

2005

## Project Team

Robert Allen, Associate Research Professor and Senior Lecturer, Biomedical Engineering, Whiting School of Engineering; Risa Lin, Undergraduate Student, Biomedical Engineering, Whiting School of Engineering

## Project Title

Enhancing a Design Repository: Capturing the Student Design Experience

## Audience

Undergraduate students in BME design classes.

## Pedagogical Issue

We propose, in this project, to improve an online Design Repository that was developed for use in the Biomedical Engineering (BME) design course, *Longitudinal Design Teams* (LDT). The first prototype of the Design Repository was implemented for the Fall 2002 term, and successfully met its initial objectives. However, the database needed improvements in several areas, including design function, behavior, models, and explicit representations.

## Solution

The team proposes to further develop the Design Repository, addressing these weaknesses, and to extend the capabilities of the database. The ultimate goal is to develop a more complete engineering design resource portal for students.

## Technologies Used

MySQL, HTML/Web Design, JavaScript, PHP, Adobe PDF

## Project Abstract

Within the last decade, engineering educators have realized that experiencing design as part of the undergraduate experience is crucial to learning. In 2002, a project was supported by the Center for Education Resources which led to the initial implementation of a Design Repository (DR) for use in the Biomedical Engineering (BME) design course, *Longitudinal Design Teams* (LDT). LDT is a multi-level undergraduate design course sequence that was instituted at Johns Hopkins University in 1998. In this course, teams of about ten undergraduates -- from freshman to senior level-design -- build and construct a prototype for a customer. Our initial objectives were to help enhance students' design learning experience in the course in these four ways:

- 1) shortening their design cycle time
- 2) enhancing the quality of their designs
- 3) helping eliminate weaker alternative designs earlier in the design process
- 4) reducing time to build and prototype.

These goals have been met. One measure of success has been the overall improvement in design quality of the students' projects since 2002. Projects have garnered a number of national awards, provisional patents, and patents since the implementation of the current DR. We now propose to improve the DR by restructuring the database to accommodate a wider range of student projects, developing more sophisticated editing, browsing, and searching functions, and including more information on engineering ontology and the process of engineering design. The assistance of student Risa Lin will be key, because she is a veteran of the class. Risa has considerable programming experience, as well as long-term interest in design and how engineers design. The project will be completed when others can use the DR effectively. The improved DR's impact will be measured by how it is used (measured with statistics) and by the overall quality of the design projects in the years ahead. Other courses within BME that could benefit from these improvements to the repository are the other freshman classes, 580.110, *Models for Life*, and 580.571, *Honors Instrumentation*, which have independent projects as part of their courses. The resource could also be useful for other design courses at Hopkins, as well as those at other universities. To maintain the DR after Risa graduates, Kevin Remmell, BME's newly appointed Academic Program Coordinator, who has considerable programming experience, has agreed to make this part of his job function. Harry Goldberg, Director of the Office of Academic Computing (JHMI), and Assistant Professor in BME, has agreed to offer guidance and advice with respect to the implementation.

A video of Robert and Risa's presentation (time=2:37) is available here:

[http://mfile.akamai.com/7111/mov/streams1.nts.jhu.edu/~jhmedia/cer/tfvideos/4\\_bme\\_full.mov](http://mfile.akamai.com/7111/mov/streams1.nts.jhu.edu/~jhmedia/cer/tfvideos/4_bme_full.mov)