List of Some of the Possible Research Projects
CSC 3990, 8/23/10

These are example projects drawn from the “Idea Incubator” of Dr. Way’s ACT Lab web site, at: http://actlab.csc.villanova.edu

**An Accessible, Tremor-filtering, Pointing Device** - This publication-ready project involves modifying existing open source software that uses a Wii controller as a pointing device for a PowerPoint presentation to smooth the jerky motion of a pointing device that is caused by an essential tremor or other tremor-causing conditions.

**Under-Representation of Advantaged Women in Computer Science** - Design and conduct a survey to figure out why women who come from an "advantaged" background (supportive parents & friends, no limits on career paths, financially stable, good student) are not selecting Computer Science as a college major or career path. This project will begin with a survey of the recent research literature in this area and proceed from there.

**How Are We Today?** - Design a web-based application that gathers news content from a wide variety of sources, performs frequency analysis on the content and determines what the general mood of the world is on that day. Steps will include creating a web-application that retrieves the text from an online news source, ranks the occurrence of all words, displays a "word cloud," creates a list of criteria words that are used to measure the mood expressed by the retrieved news (happy, sad, etc.), can be configured and targeted to other domains beyond news, such as politics (what is the political mood of the web? what is the political bias of a web site?), celebrities (how does the web feel about Tiger Woods?), specific countries (what does Europe think of the U.S.?), etc. Similar project was called NewsMood.

**Automated Web Form Validation** - Extend an existing ACT Lab tool that analyzes HTML forms for errors and omissions to be a web-based application. See the lab director for source code of the current tool.

**Skypebot** - Develop an AI application that uses speech recognition and speech generation to hold a conversation via Skype. Develop an initial one as an educational tutor or other education related intelligent agent. Other possibilities including developing unusual or funny personalities.

**Dynamic Computer Architecture Design** - Modify an open-source or research compiler to analyze a source program and generate a description of a best-fit computer architecture for that program. Then, use a computer architecture simulator, or similar software tool, to simulate that best-fit architecture as it runs the original source program. Perform experiments to determine how this approach compares with running on a variety of standard architecture types or configurations.
**Cell Matrix Compiler** - Modify an open-source or research compiler, or write your own from scratch, to translate a source program into a Cell Matrix specification. Preliminary and limited work has been done on this, but there remains much more to do. See the Cell Matrix website, our recent work, or the Computational Nanotechnology Group page to get started.

**SNITCH** - Snitch is a Java application that scans the text in a student paper, identifying passages that might be plagiarized, searching the Internet for matching web sites that contain the passages, and finally presenting an HTMLized version of the original student paper with embedded links to any plagiarized material. This project would involve making improvements to the existing tools by developing better techniques for detecting plagiarism, and could include all-new development or porting to a different platform or making the tool web-based.

**Automatic Image Description** – using the department’s 3D capture rig, devise a technique and algorithms for searching in 2D images for matches contained in a database of 3D figures. Generate a description of the image based on what is found.

**Other general areas that might be interesting:**
- Computer or network security
- Encryption
- Privacy
- Green computing
- Optimization for power use minimization
- Speech recognition for use in classroom
- Nanotechnology and nanocomputing

Just about anything that interests you can be turned into a research project!