CSCI 477a Project Descriptions
Fall 2014

Robotic Limbs

Estimated Team Size: 6

I have a software system that runs motors that control robotic limbs and cadaveric fingers to simulate the function of the spinal cord. I have a background in ME, so I would appreciate some CS students working with my lab manager, Emily Lawrence, to create a well-documented, modular system that can be expanded and maintained easily. It is a large-ish project that has some code in C for real trim control, Python to manage data-streams, etc.

The students could take a duplicate system I have and start assembling it from the various parts that we have, with supervision from my grad students and post-docs that built and use the system.
Smog Tips

Estimated Team Size: 8

Clear Sky Systems has a current line of business licensing point-of-sale software (“Smog Master”) designed specifically for smog test-only shops. Sales are generated through word of mouth, ad mailers, and the Smog Master website, SmogMaster.biz. The new line of business for Clear Sky Systems is a consumer-facing website providing referrals for smog shops located near the consumer’s physical location, based on zip code and/or address.

Smog shops who wish to participate in the referral program pay a monthly fee to earn a higher listing, increased visibility, and richer information about the shop in the consumer’s search results, although smog shops who do not participate in the program will nonetheless be listed but with less visibility and information about the shop, and lower ranking in the search results.

The project should achieve these deliverables:

1. Consumer website allowing prospective smog shop customers to locate a shop near them based on zip code and/or address, with richer, more valuable information for the shops who are enrolled in the website referral service. Shops not participating in the referral service will be listed last, with only basic shop information displayed (name, address, phone).
2. Backend Content Management System to allow dynamic changes to the consumer website without technical knowledge of websites or knowledge of any technical web tools (HTML, PHP, SQL, etc)
3. Backend functionality for Clear Sky Systems administrators to allow: adding, changing, and removing smog shops and the associated shop information on the consumer referral website; ability to assign a rank to each shop that determines placement in the search results (1, 2, 3, etc); dynamic reassignment of ranks when a shop is inserted between existing shops
4. Link to allow an email to be sent to a Clear Sky Systems email address for those smog shops interested in participating in the referral service
5. Bi-directional links for the smog shop from the consumer website to/from the SmogMaster.biz website, with promotions providing discounts and/or bundled pricing for purchasing both the Smog Master software license and the consumer referral service
6. Redesigned SmogMaster.biz website with an updated design to match the “look and feel” of the consumer website, and one functional change: provide a dynamic, limited-use link to a software download of the trial version of Smog Master for those shops who request it
7. SEO optimization for both consumer and Smog Master website
8. Analytic tools to report site traffic and potential optimization improvements
Furniture E-Commerce Site

Estimated Team Size: 12

We are a mid-sized office furniture dealership in Burbank with about 25 employees. The company has been in business since 1957. We are looking to build and integrate a project intranet and CRM to give better visibility into where any given prospect/project is in our process.

This intranet would be part CRM, part business process management system to help us manage prospects and projects that are in house to coordinate among our team members in sales, customer service, sales support, CAD design, shipping/receiving, and installation.

Once a lead or prospect is entered into the system, the salesperson would be able to enter notes, attach files and schedule follow up action to help them close sales (CRM).

They will also be able to schedule CAD design resources for each project/prospect. That request for design resources would then go to our design department and put in queue for the design department to assign to a designer and put on the calendar. We’d like visibility into what is being worked on in the design department.

The sales person will also be able to convert their prospect into a sale, in which case it will go to customer service to begin processing the order with the manufacturers.

Our warehouse will be able to indicate which product has been received and if it was received complete with damages etc. This will notify customer service.

Customer service will then need to schedule delivery of the job with our installation department. We’d like to see a calendar of scheduled deliveries. Once the delivery is complete, the record will be updated by our drivers with any punch list items for customer service to follow up on. Ideally, we’d like the drivers to be able to access the system through an iPad so they can have access to all the project drawings and information.

We’d also like some general intranet/communication functions to be discussed.

- Sales management apps: CRM, quotation builder
- Business operations apps: project management, inventory, customer service, CAD design scheduling, receiving, delivery/installation
LA County Assessor’s Office

Estimated Team Size: 12

I’m excited to reach out and connect you with Scott Thornberry. Mr. Thornberry is the Director over the County of Los Angeles Assessor’s Systems Modernization Project. As you may know, in accordance with the California Constitution the County Assessor must value all taxable property in Los Angeles County annually. Currently our appraisers utilize several systems that are antiquated and in need of replacement.

Over the last several months Scott has on boarded several developers and middleware tools to support this $27 million effort. I believe having a team from your class build a component of the system would do a few things:

1. Broaden their understanding of the technology opportunities in local government.
2. Make them more competitive applicants for permanent positions in application development, project management or general IT administration.

The project would be to develop an application using J2EE, BPMN 2.0, BPEL, XML, enterprise middleware products such as business process management systems, horizontal portals, business rules management systems, SOA tools, ETL tools, etc., and develop web services using WSDL, SOAP, REST, etc.
Baseball League Manager

Estimated Team Size: 10

There are hundreds of baseball leagues across the US, from tee ball and little league, to high schools, college and adult leagues. While these leagues may differ in rules, they all have similar needs in terms of league and team management. The league needs to set up seasons, set up divisions and teams, sign up potential free agents looking for teams, schedule games and umpires, accept payments and manage league finances. Teams need to be able to set up and edit personal team spaces, edit rosters, and post-game scores and statistics. Both the league and teams need to communicate with groups of players (individually, at the team level, or subsets) via email or text. Historical statistics should be maintained across seasons, divisions and teams, and there should be a way to view both current season and all-time statistic leaders.

The main league website should allow easy editing of various news and notes, rules, and sponsors. Images and videos should be easy to upload and incorporate, and it should tie in nicely with social networking sites. It should be easy to use on both desktop and mobile devices (they don't have to look identical, but should offer similar functionality), and content should be easy enough for a non-technical user to update.

Finally, the site should be able to be run in 2 different modes. First, it can be deployed to a league's personal servers and run as a one-off, meaning only THAT LEAGUE is available. Second, it could be run on a shared server, with the URL determining which league's information you see.

Theoretically, the site COULD be built to handle multiple sports, and should be architected with that in mind, but the initial incarnation will be baseball-only.
Automated Program Grading System

Estimated Team Size: 8

In many computer science courses, students are required to write a program based on a provided description. There is usually a set of inputs that defines a specific output. Since most programs, especially in lower-division courses, are deterministic, the output for a given input will always be the same.

Although multiple test cases can be provided to students at the time the program is assigned, grading usually occurs on inputs that were not provided to the students so they are not able to spoof the output. This often leads to complaints from students since they don’t know what test cases they need to implement.

Imagine an assignment submission system that instantly compiles and runs a student’s program on submission with random or defined inputs as specified by a TA or professor. The output can be compared against known output, and the student can receive a grade instantly. If the grade is not acceptable to the student and the deadline has not yet passed, the student can modify the program and upload it again.

This will provide students with instant feedback on their assignments and the ability to have a program graded more than once if allowed by the professor.
In-Class Clicker Software

Estimated Team Size: 12

Receiving real-time feedback from students is often beneficial to a professor. When explaining difficult concepts, it would be helpful if a professor knew whether the class was actually comprehending what was being taught. In smaller classes, this can be achieved by merely asking a question and receiving feedback from the students. Some students may be hesitant or embarrassed to answer, or some students are just quiet and do not want to answer. In larger classes, the problem is heightened because many people can feel lost in the crowd.

Clickers have been utilized in classes to allow professors to solicit feedback from students. A professor can put a question on a slide, and the students can answer the question with a handheld device. With the increased use of laptops, tablets, and smartphones, an additional piece of hardware that is required to be purchased is not necessary. A program can be created that allows students to answer questions posed by a professor through an internet-enabled device. This also allows other types of questions than solely multiple choice to be provided. Professor could perhaps have a scroll bar to indicate understanding of the class, and the results can be displayed in real-time on the professor’s device.

Quizzes could be taken in real-time, attendance can be taken, and many types of unique questions could be configured. Statistics can be provided, and links into some popular presentation software can be included.
Automated Class Web Page Generation

Estimated Team Size: 10

Every semester many professors create new web sites for their courses. There are a number of variables that need to be updated, such as the dates of the lectures, the days that do not contain class, the semester (fall, spring, summer), the name of the class, the meeting times, the number of assignments, etc. It takes a number of hours to update a site for a new semester even though the template for the site typically remains the same. There should always be a link to the syllabus, assignments, lectures, etc., but the content on the pages will be different.

I would like a program that allows creating a course web site from a template that has variables automatically or manually configured. Dates of the lectures, course numbers, title, section, etc. can all be automatically generated from existing data, and other information can be manually configured by the professor or TA. Creating a new web site for future semesters can hopefully be accomplished in a matter of minutes rather than hours.
**Airline Comparison Site**

Estimated Team Size: 18

Many frequent travelers often ask questions such as:
- How far in advance should I purchase my airline ticket?
- Is there a specific day of the week that has lower prices?
- Is there a specific time of the day that has lower prices?
- Do different airlines change their prices at different times?
- Does the source and destination airport matter for how long in advance I should purchase my ticket?

Variations in airline ticket prices are difficult to determine. With merely having spot data, no pattern may be determined. If data was available from every day on multiple airlines between multiple sources and destinations, perhaps a pattern can be found to determine the optimal time to buy a ticket. It may be that to fly from LAX to Narita, Japan, you should buy your ticket 32 days in advance, but to fly from Burbank to San Francisco, you should buy your ticket 16 days in advance.

I would like an application that graphs out the price of tickets between multiple source and destination airports based on how far in advance we are purchasing tickets. The application should run within a browser that can be accessed on mobile devices.

There are many features and airlines that may pose challenges to the team, but I think this project has a lot of potential to be a very useful application to a wide array of travelers.
Income and Expense Reports

Estimated Team Size: 10

Paying bills and keeping on track with payments are sometimes difficult to do. Some people have learned to use software such as Quicken, and others use spreadsheets or good old-fashioned pen and paper. I would like a system that automatically finds when bills are due, sends reminder notifications, then plots spending habits. For example, I would like the following questions to be answered by the system:

- How much did I pay on my mortgage last year, how much went to principal, and how much went to interest?
- How did my credit card bill fluctuate month to month?
- How much money was deposited into my account?
- How did my utility bills fluctuate with the weather?

Having graphical displays of all of these items will allow a person to visualize how outside factors and spending habits are formed. The system should not have a steep learning curve like Quicken and should automate as much as possible.
Federal Aviation Administration Competition

Estimated Team Size: 10

Any project can be chosen from http://vsgc.odu.edu/ACRPDesignCompetition/. A representative from LAX will be working with the team to develop the project and act as the stakeholder. This competition happens every year, and we have had success with CSCI 477 groups participating and even winning in the past.
Root Learn Learning Management System

Estimated Team Size: 8

Root is a learning management system designed and built by USC students. Root helps instructors teach more easily and makes learning more engaging for students. Root offers students and instructors social tools for communicating inside and outside the classroom, a content-management system for easily creating and consuming a digital textbook, automatically-graded in-class clicker questions, and at-home quizzes that reinforce students and help them form better study habits. Root is totally free to use. Root is funded by a grant from the NSF to spur innovation in STEM teaching tools.

We just closed a development cycle yesterday and are planning our next version iteration (v3.5) this week. We have a series of project goals ranging from code maintenance to feature development on both our backend (PHP/MySQL) and frontend (PHP/JS). I am currently leading one graduate student and our development cycle would be improved with more assistance. I think students are well suited for the task because the codebase is small and the end product they are creating solves a pain that they face as students!
**Employee Management System**

Estimated Team Size: 8

This project will require creating an employee management system to manage scheduling of a staff of employees. The employee schedules change frequently, there are a lot of outside activities that must be staffed by different people, and the entire management of the employees will be required. This project will have a frontend, backend, and a mobile component.
Aviation Safety Management System

Estimated Team Size: 8

The FAA has proposed a regulation that requires a Safety Management System (SMS) to be established and put into practice at major US airports. The most key element of this SMS is for employees at all levels to participate in the reporting of safety hazards. The idea behind the app project is that airport workers are often busy and go from one task to the next and while they may see a hazard and intend to report it that good intention may get lost in the rush of activities that happen through the work day.

The idea is for an app whereby the worker can make a report of a hazard that is observed; pick a classification that is established in the app; chose a level of priority and then send. The location of the hazard would be tied in with a GPS coordinate. This is a high priority project for the FAA and I think would receive very favorable attention. The emphasis is simple, easy to use, and fast. 15 seconds probably front to back.