Lecture 3: Potential Project Topics
Schedule

✦ Midterms

✦ Thursday October 2, 2014 (for lectures 8/25-9/25)

✦ Thursday November 6, 2014 (for lectures 9/30-10/30)

✦ In class

✦ Note: No class on October 23 (I am away)

✦ Final

✦ Week of December 15th (covers everything)
Assignment 1

- Research report
- 2000-3000 words
- Select a topic from
  - Security in Software Engineering
  - Cyber-physical systems
  - Concurrency/Scalability in Software Engineering
- Google scholar is a great source for looking for papers
- Due on Sept. 12th
- Submission site: ANGEL
Term Project

* The descriptions of the problems are imprecise and incomplete (of course)

* You need to
  * Define a software requirement specification (SRS) -- Assignment 2
  * Design a software system -- Assignment 3
  * Improve the design (?)
  * Implement the software system -- Assignment 4
  * Test -- Assignment 5
  * Provide complete documentation -- Assignment 6
  * Demonstration -- Oral Presentation (week of 12/8)
Oral Presentation

- In the last week of class (week of 12/8)
- Each team gets 15-20 mins to describe and demonstrate their project
- Each team votes for the best project (up to 2 votes)
- The winning team gets 5 bonus marks to add to their final grade
Do you know...

- About 40% of food in the US today goes uneaten
- In 2010, the US wasted 33 million tons of food
- Yet, 1 in 6 Americans doesn’t have enough to eat
Do you know...

- Each year Americans throw away more than 3 billion batteries
- That’s about 180,000 tons of batteries
- Batteries are hazardous waste and need to be handled properly
What is it?

- A software solution for reducing food waste, properly disposing hazardous waste, or both

- Large group of people care about the situations

- Problems still exist

- Main reason: lack of connection between people who would help and the food/waste
Who are interested?

- People who care about the planet
- Restaurants which often have extra food that will expire
- Food bank/drive
- People who have hazardous waste but don’t like to bother disposing it properly
- EPA (Environmental Protection Agency)
Use food waste as an example:

- Types of users: food owner; volunteer; food bank
- Restaurants/food owners post information (what food, quantity, location, etc.)
- Food banks post information of what they need
- Volunteers provide their schedule, regular route, etc.
- System matches volunteer with food source and destination and sends out notification
How difficult?

- May involve multiple platforms
- Web, mobile, tablet, etc
- Google map API
Why It is Important?

- Together we make a better planet.
Project 2

- When the baby boom turns to great-grandparents boom...
- High pressure on health system/nursing homes
- Dangerous for elder people to live alone
What is it?

• A mobile app for elder care & assisted living
Who are interested

* Elder people who don’t want to live in a nursing home
* Hospitals, nursing homes
Description

- Keep track of health-related data, such as blood pressure, etc.
  - Periodically sends data out to doctors
- Medicine schedule and alert
- Automatic emergency calls when the mobile holder falls
How difficult?

- Accelerometer data
- False alarm
- High expectation for GUI design
Why it is important?

- Help to improve elders quality of life
- Monitor health conditions in real-time
- Reduce pressure for health care system
Project 3

- Collaborative Whiteboard System
Collaborative Whiteboard System

* User can create an account.

* User can log in the system after the account is successfully created.

* After logging in the system, user can see the shared whiteboard, a list of other users who are currently online, and a message channel.

* User can draw on the white board. Use different color to differentiate different users.
Collaborative Whiteboard System

- User can post messages to the message channel.
- User can also send a private message to selected user(s).
- A user can erase what he/she has drawn on the whiteboard if needed.
- …. (whatever that makes sense to you).
Restaurant Management System

"I'm sorry, sir... I don't give suggestions any more."
Restaurant Management System

- When a waiter logs in the system, he/she can see a floor map with tables. Different colors represent different status of the table (green: ready; yellow: occupied; red: dirty; gray: served by other waiters).

- Waiter can click on a table and order an item for that table.

- Kitchen staff can log in and view the orders.

- When an order is ready, kitchen staff can send a notification to the corresponding waiter, and the waiter will be notified next time when he/she logs in.
A server keeps track of all activities, and provides analysis which consists of by-the-day and by-the-month breakdowns of revenue and revenue percentage per menu item, menu item popularity, and personnel efficiency.

The restaurant manager can log in the system, and retrieve the analysis.

… (whatever that makes sense to you)
Project 4

* Job Scheduling Visualization
Job Scheduling Visualization

- When the system is initialized, the system administrator fills in the system configurations: CPU capacity, network bandwidth, memory, etc.

- The system administrator can choose from a set of scheduling policy: FCFS (first-come first-serve), SJF (shortest job first), Round Robin, etc.

- After initialization, the system is waiting for jobs.

- User can submit jobs by filling out a job profile form: required CPU cycles, network, memory requirements, time interval during which the job must complete.
Job Scheduling Visualization

- The system schedule jobs using available resources upon receiving the requests, and maintains a waiting queue if some jobs cannot be scheduled right away.

- Visualize the current usage of the system, current job(s) which are running in the system, and the waiting queue.

- The system keeps track of the throughput, average waiting time and average turnaround time for all jobs, and displays the information upon request.

- Extend the system to accommodate priorities of the jobs.

- … (whatever that makes sense to you).
Project 5

* Spacewar
Space War Game

- User can create an account by filling out player’s profile
- Players can then log in the server, and see a shared space, in which there are user-controlled spaceships, as well as robot spaceships.
- Player can use the keyboard (arrow keys) to control the movement of the spaceship.
- Player can shoot using the space key.
- Player’s blood level decreases if he gets shot by other players or robot spaceships.
Space War Game

* Once a spaceship runs out of bullets, it takes a predefined period of time to reload.

* The system will keep track of every player’s score and keep the highest score.

* Extend the game to accommodate two collaborative players to control one spaceship: one pilot, and one shooter.

* … (whatever that makes sense to you).
More Ideas

- You propose a project
- Open source projects
- If you think you are ready, adopt a CS420 project
  - real customers
  - more technologies
  - expect longer learning curve
Have Fun!