The purpose of this exercise is to design a time and space critical system with a very limited display and control area. A prototype of your system will be tested with real users. This exercise will be done in three teams of four persons each.

PART ONE: Requirements Analysis and Prototype Design
Problem Statement:
Imagine a sprinkler system used in a home residence that automatically turns various water sprinklers on and off based on a number of atmospheric, ground, and user defined parameters. Together with your group, you are to design the control (interface) for such a system. Your system must satisfy the following requirements and constraints:

- At least 4 sprinklers planted at various locations throughout the home’s lawn and gardens should be controlled by your system.
- The sprinklers should turn on and off automatically depending on current air humidity levels. The user should be able to decide what the appropriate on/off levels are for each sprinkler, and program this information into their automated sprinkler system.
- Users should be able to set timers for each sprinkler (i.e., when each sprinkler goes on and off throughout the day) that override the automatic settings. Users may wish to vary timer settings depending on days of the week or time of year.
- All sprinklers should be controlled from one central interface located somewhere in the house.
- Your system should support the addition or deletion of individual sprinklers (e.g., a user should be able to buy another sprinkler and incorporate it into his or her existing automated system)
- The control area of the unit cannot be larger than 3” x 5”. The display area cannot be larger than 3” x 5”.

In addition to the above list of minimum requirements, feel free to add other functionality to your system. Remember to do user studies. During this design project, pay particular attention to time critical aspects and spatial issues (e.g., mapping control functions to variously located sprinklers) that make this design challenging. As always, be sure to identify who the users of your system are and what their abilities are.

PART TWO: User Evaluation of your prototype
Procedure:
This part of the exercise will give you practice in testing your prototype design with real users. Develop a mockup of your sprinkler system control and display as a storyboard on 3” x 5” cards.
Each card will represent a unique state of the user interface. In response to control actions by the user, you will display the correct interface state. This is called the “Wizard of Oz” method.

Choose pairs of users to test your system. (You must test at least one pair.) Explain the basic system to them and then ask them to perform the tasks. Choose two core tasks to test. (Example: User must initialize sprinkler system with the front yard sprinkler set to water at 7am-8:30am Monday through Friday and the backyard to water at 8pm-8:30pm Saturday and Sunday. Make the tasks goal oriented; don’t tell them how to do the task.) You will videotape these sessions. Andy will provide help with this. You can use our usability testing lab in Deschutes if you like. Contact Andy to do this.

During the evaluation session:
1) *Learn the software.* One team member briefly explains how the interface works and demonstrates the software. The users can explore and practice. No user's manuals are available. The other team members take notes on usability problems. How much time did the tester spend learning? What are the learning problems due to design? Other problems?
2) *Do real-life tasks.* The learner will then be given several tasks to do. The team members take notes. How much time does it take to do each task? What are the usability problems due to design?
3) *Critique the system: Ranking.* Using a ranking from 0 (terrible) to 5 (excellent), the observers ask the learner to evaluate the system compared to other software she/he has used. Here are the performance measures: functionality, learnability, quality of output, errors, performance time, acceptability, enjoyableness, fatigue. What is this rating? Explain?
4) *Critique the system: Explanation.* At the end of the session, the team members should ask the users several questions about what problems he/she experienced and why. These are usually a follow-up to sections 1-3 above. What problems did the user experience and why?

**DELIVERABLES**
1) **Report**
   Part One: Write a 3-4 page description of the system, include information about the user group, the functional requirements, the usability requirements, and the prototype design. Include a sketch of the user interface, a sample house and landscape, along with where the sprinklers are located, in your design, and how to perform two core tasks.
   Part Two: Write a 2-3 page description of the usability evaluation of the prototype answering the questions above in Part Two. Did you meet your usability requirements?

2) **Studio Design Presentation (Design Crit)**
   Your team should prepare a 15 minute presentation of your interactive artifact for the class. Expect to engage in a lively class discussion about your design for another 5-10 minutes after your presentation.

   Your 15 minute presentation should cover:
1. How you went about gathering the requirements, e.g. user studies. (2 min: 1 slide/sheet)
2. The functional and usability requirements you developed. (3 min: 1 slide/sheet)
3. The initial design, demonstrating with one common task how it meets the requirements.
   (5 min: many slides/sheets)
4. Problems that you have encountered in the design. (5 min; 1 slide/sheet) Include one videotaped usability problem – no more than a 2 min. episode. Andy can help you create the clip.

You can prepare either overhead slides or large poster-size sheets of paper which we can tape to the classroom walls to show the various aspects of your system. (We encourage you to try the poster sheets rather than Powerpoint.) Including sample data/information in your design display will help your audience understand your system better.

3) **Hardcopy of the presentation** to hand in to the instructor for grading purposes in addition to the report.

**EVALUATION**
Your team will be evaluated based on:
- Overall effort
- Quality of design
- How well your design addresses time critical issues and spatial mapping issues
- Description of system users
- Classroom presentation
- Written report
- Design crit participation (you will be evaluated individually for this)
Here is the list of team members and their preferred emails for Exercise #3.

Please note that the Exercise is posted on the website under "Assignments".

Please contact as needed.

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