CSCI 373 Project 2

Overview

Create a **graphical interface** to an IoT-type device. The IoT device must have the following features: (1) at least one sensor, (2) interactivity---the ability to change state in response to user input, (3) wireless data transfer, and (4) a web browser interface that both displays the sensor(s) output and provides GUI control of some aspect of the IoT device's behavior. The device may be battery powered or tethered to a wall-jack power supply.

This is a software design project. It is assumed that you already have an IoT device meeting the above criteria or that you can easily make one. While this is not a course on graphic design, you have learned to use tools for creating web-based graphical displays (e.g., Raphael and WebIOPi). In this project, you will use these tools (and others if desired) to develop an interesting and aesthetically pleasing interface to your IoT. As discussed below, your grade will be based on your software design and implementation.

Requirements

You may work in teams of two or three, or you may work individually to complete this project. Your team is required to design, implement, and test a graphical interface to a compliant IoT device (see criteria above), as well as document these efforts. Your software design project must include the following phases:

I. Identify needs and establish requirements
II. Develop alternative designs that meet those requirements
III. Build an interactive version (so that it can be communicated and assessed)
IV. Evaluate the design (measure acceptability)

Notice that these are the design requirements used for Project 1 which was, in large part, a hardware design project; this is intentional---structured design is applicable across domains.

Phase I. Identify needs and establish requirements

This is the observation and research phase of the design process. The objective of this phase is to identify design criteria: what is the design objective/purpose and what characteristics must it have to meet that objective. Establishing design criteria typically requires research and analysis; a study of similar designs is manditory. The design objective must be clearly stated and the design criteria (i.e. mandatory characteristics) must be listed and possibly weighted according to relevance for design success.

In the case of Project 2, your criteria will be for a software design. Examples of design criteria for a similar project might include: display small changes in a floating point value updating 10 times a second, provide variable speed control for a contuous rotation servo, provide on/off control, create a mobile device display visiable from 2 ft, create a display that draws attention to an alarm, create a display whose form reflects its function, create a display that is visually interesting but yet clear and simple to use, use software that is compatable with WebIOPi, use software that is compatable with Linux....

If your design criteria are not accurate, well motivated, and complete, it will not be possible to

make the necessary design choices in Phase II, or worse yet, your design will fail in Phase III (Implementation), or Phase IV (Evaluation).

Phase II. Develop alternative designs that meet those requirements
This phase requires knowledge of both your requirements, i.e., the design criteria, and your resources, i.e., the materials available to implement the design. Using this knowledge, you must conceptualize possible design solutions---designs utilizing your resources and fulfilling your requirements. Brainstorming is a well establish procedure supporting this phase of design. Use brainstroming techniques to conceptualize your graphic display.

Phase III. Build an interactive version
This is the prototype implementation phase of design, and it begins with selection of the most promising conceptual design generated in Phase II. Decision matrices are a well established tool supporting that selection process. Decision matrices are designed to support weighted design criteria but can be used with unweighted criteria as well.

Prototype implementation should follow a predefined *critical path*, a development sequence that ensures, to the greatest extent possible, that system dependencies are in place as the implementation proceeds and that the need for an alternative design is identified as soon as possible. An example design approach was presented in class.

IV. Evaluate the design
Once your prototype is complete, it must be tested to ensure that it meets the design criteria established in Phase 1. Incremental prototype development, including testing, in Phase III, reduces the probability of failure in Phase IV. A typical design will cycle between Phase III and Phase IV, using Phase II information to guide alternative design choices until a successful design is developed and verified. In production systems, user testing is an essential part of phase IV.

Design Presentation
You must present your Project 2 design and your design process in a presentation at the time of our final exam. Your presentation must include the information listed below. You are encouraged to use tables, graphs, and other pictorial representations to convey the required information.

Introduction
Start with a hook---something to grab the reader's attention and provide an overview of your design.

Project Management Section
If applicable, state the names of the team members and each members contribution to the overall project. Mention any management difficulties you encountered.

Phase I Section
State the project objective and design requirements. State the project objective and design

requirements. Justify the design requirements with calculations and product surveys as needed.

Phase II Section
Present the alternative designs developed via brainstorming.

Phase III Section
Present the decision matrix used to identify the prototyped design. Provide any additional justification necessary.

Present your development schedule and discuss/identify your critical path.

Phase IV Section
Summary your test findings; be sure to address each design criteria. Discuss user testing if applicable. Discuss any redesigns.

Conclusion
Summarize the overall design experience and your final design.

Grading

Design Presentaion: 40%
Graphical User Interface: 60%

Your user interface will be graded based on functionality, aethetics, and visual engagement.