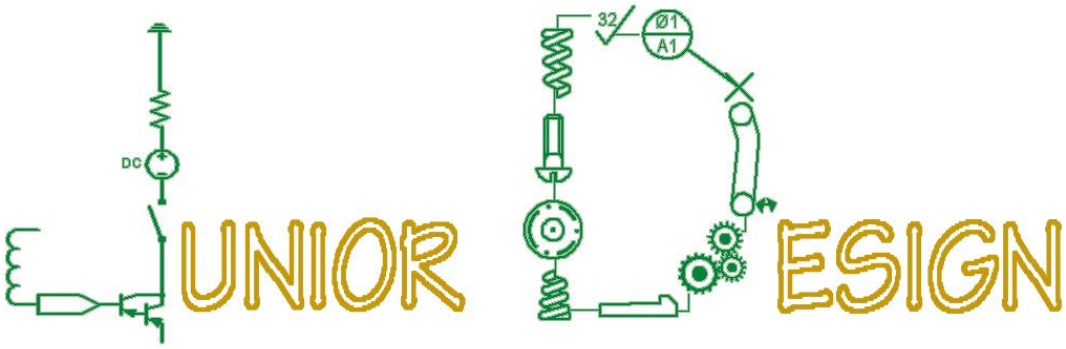
REQUEST FOR PROPOSAL
FOR ENGINEERING DESIGN

ROBO-ART

photo by bk1bennett



EGR 3380
Engineering Design I
SPRING 2011

Department of Electrical and Computer Engineering
Department of Mechanical Engineering
BAYLOR UNIVERSITY

1. STATEMENT OF WORK

Qualified engineering design teams are invited to submit technical proposals for the design of a *kinetic sculpture*, hereinafter referred to as *Robo-art*. Proposals are to be submitted to the instructors of EGR 3380, hereinafter referred to as the *client*. Upon client approval of a conceptual design, each engineering design team, hereinafter referred to as the *team*, shall build, test, and evaluate a prototype device, and shall provide the client with full engineering documentation of the prototype design.

Additional instructions and schedules not included in this RFP for completing design, presentation, construction, testing, and documentation milestones will be found in the course calendar, milestone assignment documents, and other specific documents to be distributed by the client at appropriate times during the project. The design, construction, testing, and reporting of the Robo-art is a requirement for completion of Engineering 3380 - Engineering Design I at Baylor University for the Spring Semester 2011.

2. DESIGN SPECIFICATION

2.2 Background

Kinetic sculpture is an artistic genre utilizing three-dimensional creations which typically employ some type of motion or other visual dynamism in order to convey the aesthetic intent of the creator. A mobile suspended from the ceiling, slowly rotating due to air currents in the room, is a familiar example of kinetic sculpture. A sculpture's motion may be naturally powered, as in the case of the mobile, by environmental effects such as wind or sun. But kinetic sculptures may also rely on more active power sources, such as electrical power, or even the physical input of a viewer through manipulation of levers or cranks.

There may be many aesthetic motivations for kinetic sculpture. Some common themes include plays on geometric patterns, mathematical relationships, symmetries and balance, ebb and flow, recursion, power, or the rhythms of either nature or technology. Some kinetic sculpture is passive, meaning that the viewer simply observes the art. Other kinetic sculptures may be interactive or reactive. Interactive sculptures invite the active input and participation of the viewer. Reactive sculptures sense the presence of the viewer and react to that presence in some way even if the viewer provides no active input.

2.3 Design Requirements

2.3.1 *General function:*

The Robo-art device

2.3.2 *Test Area:*

Devices will be tested.

2.3.3 *Power:*

Power is to be supplied.

2.3.4 *Automation:*

The device must be controlled by the Arduino microcontroller. It shall be activated by.

2.3.5 *Sensing:*

In order to.

2.3.6 *Size:*

The device shall.

2.3.7 *Motion:*

The device shall move.

2.3.8 *Operation:*

The device shall.

2.3.9 *Setup, Operation, & Reset:*

The device shall…

2.3.10 *Safety:*

The device must be deemed safe by the client. This includes, but is not limited to, to the following considerations with respect to the operator and others nearby: safety from electrical shock hazards; safety from pinch points; safety from sharp edges and points; safety from flying debris or falling objects; safety from chemical contaminants. The device shall also operate without damaging the floor, walls, ceiling or any furnishings of the room.

3. SAFETY REQUIREMENTS

The team shall conduct all construction and testing with safety as the paramount consideration. Failure to observe workplace safety rules will lead to penalties in performance evaluation. Egregious or repeated safety violations, or disregard for Safety Officers, can result in dismissal from the course.

Cleanliness in the workplace is expected at all times and in all work areas. Failure to observe workplace rules will lead to penalties in performance evaluation. The design team shall clean all work areas with each use.

4. REPORTING & DOCUMENTATION REQUIREMENTS

The team shall document the design by use of manuscripts, calculations, schematics, flowcharts, computer code, and design models/drawings. Specifications for required documentation and due dates not otherwise contained herein will be contained in the course calendar and/or will be distributed by the client at appropriate points during the project.

4.1 CONCEPTUAL PROGRESS REVIEW (CPR)

4.4.1 *Date*

9/22/2011

4.4.2 *Objective*

The CPR is a formal presentation. The client should be apprised of your conceptual design progress; i.e., you should describe one or more solution concepts that your team is considering. The main goal is to foster constructive discussion of possible design approaches for the purpose of advancing the team toward concept selection.

4.4.3 *Format*

- Duration: 4-6 Minutes
- Given by one team member.
- Visual aids using PowerPoint and/or the document camera
- Business casual dress.

4.5 CONCEPTUAL DESIGN REVIEW (CDR)

4.5.1 *Date*

9/29/2011

4.5.2 *Objective*

The CDR is a *top-down* formal presentation to the client of the selected design concept. The client should understand how your proposed design will meet the specifications in this RFP. The client should gain a clear picture of the major components/systems and their overall arrangement/function. Furthermore, the client should understand your team's implementation plan for completing the project.

4.5.3 *Format*

- Duration: 7-10 Minutes
- Given by two team members, with approximately equivalent contributions.
- Professional quality visual aids (PowerPoint as primary platform); other visual aids as appropriate
- Business casual dress.

4.6 SUBSYSTEM REVIEW (SSR) & SUBSYSTEM DRAWINGS (SSD)

4.6.1 *Date*

10/6/2011

4.6.2 *Objective*

SSR & SSD is for the purpose of communicating the detailed design of a major *subsystem* through a presentation and drawings.

4.6.3 *Presentation Format*

- Duration: 4-6 Minutes
- Given by one team member
- Professional quality visual aids (PowerPoint as primary platform); other visual aids as appropriate
- Business casual dress

4.6.4 *Drawing Format*

- Subsystem Drawings
  - Assembly drawing(s) of subsystem including *bill(s) of materials*.
  - Circuit schematic(s) for subsystem.
  - Detailed drawings of subsystem parts that must be manufactured

4.7 SUBSYSTEM TEST (SST)

4.7.1 *Date*

10/13/2011

4.7.2 *Objective*

The subsystem test is a hardware demonstration of the performance of the subsystem described in the SSR & SSD.

4.8 SYSTEMS INTEGRATION REVIEW (SIR) & SYSTEMS INTEGRATION DRAWINGS (SID)

4.8.1 *Date*

10/20/2011

4.8.2 *Objective*

SIR is for the purpose of communicating the detailed design and integration of two major *subsystems* through a presentation and drawings.

4.8.3 *Presentation Format*

- Duration: 4-6 Minutes
- Given by one team member
- Professional quality visual aids (PowerPoint as primary platform); other visual aids as appropriate
- Business casual dress

4.8.4 *Drawing Format*

- Subsystem Drawings
  - Assembly drawing(s) of all subsystems involved, including *bill(s) of materials* (and including revisions of SSD).
  - Circuit schematic(s) for subsystems.
  - Detailed drawings of subsystem parts that must be manufactured

4.9 SYSTEM INTEGRATION TEST (SIT)

4.9.1 *Date*

10/27/2011

4.9.2 *Objective*

The system integration test is a hardware demonstration of the integrated performance of the two subsystem described in the SIR & SID.

4.10 PRELIMINARY DESIGN REVIEW (PDR) & PRELIMINARY DESIGN DRAWINGS (PDD)

4.10.1 *Date*

11/3/2011

4.10.2 *Objective*

PDR is for the purpose of communicating the detailed design of the entire device through a presentation and drawings.

4.10.3 *Presentation Format*

- Duration: 4-6 Minutes
- Given by one team member
- Professional quality visual aids (PowerPoint as primary platform); other visual aids as appropriate
- Business casual dress

4.10.4 *Drawing Format*

- System Drawings
  - Assembly drawing(s) of entire system and all subsystems including *bill(s) of materials*.
  - Circuit schematic(s) for entire system.
  - Detailed drawings of parts that must be manufactured

4.11 PRELIMINARY SYSTEM TEST (PDT)

4.11.1 *Date*

11/10/2011

4.11.2 *Objective*

The preliminary system test is a preliminary hardware demonstration of the performance of the entire system as described in the PDR & PDD.

4.12 FINAL DESIGN TEST (FDT)

4.12.1 *Date*

11/17/2011

4.12.2 *Objective*

The compliance test is the final and critical hardware evaluation. System performance will be evaluated against all specifications. Data will be collected and analyzed.

4.13 FINAL DESIGN REVIEW (FDR)

4.13.1 *Date*

11/21/2011

4.13.2 *Objective*

The FDR is a public presentation of the design to a general audience including the client, other design teams, invited faculty, students, and guests.

4.13.3 *Presentation Format*

- Duration: 3 minutes ±20 seconds
- Given by one team member
- Professional quality visual aids (PowerPoint as primary platform); other visual aids as appropriate
- Professional dress

4.14 FINAL DESIGN DOCUMENT (FDD)

4.14.1 *Date*

12/5/2011

4.14.2 *Objective*

The Final Design Document is an archival document that provides a complete and permanent record of the design.

4.14.3 *Report Format*

The format for the final report will be communicated to the design teams by the client at the appropriate time

4.14.4 *Drawing Format*

- Subsystem Drawings
    - Assembly drawing(s) of entire system and all subsystems including *bill(s) of materials*.
    - Circuit schematic(s) for entire system.
    - Detailed drawings of parts that must be manufactured