**Provost’s Learning Innovations Grant for Faculty**  
**Request for Full Proposal**  
**2010-2011**

**Project Title:** Experimental Liquid Display System

**Applicant(s):**

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Summary of Project:
The goal of this project is to showcase student creativity in a new media palette that is publically viewable.

This project will create a translucent and self-forming “new media” palette using falling water as a “canvas”. This palette may take a form a projected image. The falling water “canvas” will then use various forms of image projection schemes chosen by students, faculty and perhaps visitors. By design, this surface will be affected by a mild breeze that will create rips and tears and the designers will need to work with this attribute of the media as an element in the final product design. Effectively the work will be partially created by human hands and partially by natures influence.

Second, this project will also enable creative techniques of manipulating falling water. This manipulation may take the form of metering, slicing, interruption, sequencing, intruding or other creative ideas to create using this new media.

Examples of potential functions:
Solid Texture (metered waterfalls)
- Statically adjustable density or texture media (i.e. controlled or metered flow rate)
- Dynamically adjustable (variable flow rates and positions for special effects)
- Adjustable media width (create stripes or blocks).
- Media sway (i.e. sweeping in and out motion of the water fall to create a solid sheet ripple.)
- Thin ripping or tearing (breeze)
- Ink/dye/pigment in fluid to enhance projection and contrast

Droplet Texture (patterned)
- Projection or illumination onto patterned droplets
- Signage from timed droplets (vertical moving marquee)
- Pixel palette Droplet control (i.e. rainy day.)

Synchronization of water pattern to projected image
- Projected image will fall with a sheet of water as if it’s a sheet of paper
- Two dimensional art
- Special effects

Z Plane Wave
- Slow back and forth movement combined with above functions.

How It Works: This project will control the distribution, metering, gating, movement and collecting the fluid to create palette variables or special effects. Proposed subsystems are:
1. Selected fluid(s) in color and viscosity
2. X-Y-Z fluid metering mechanisms
3. Fluid porting mechanism
4. Collection/ recycle trough
5. Pump(s) with variable control (pressure, flow rate)
6. User Interface/ controller selection
7. Programmable control to enable future creation and experimentation.
8. Weatherproof projector and electronics
9. Fail safe monitoring and mechanisms
Targeted Learners
Teams will be comprised primarily from seniors and graduate students. The number of students will be approximately fifteen from CIAS and KGCOE. This will be a three quarter activity. Fall to design concepts, Winter to the design hardware, and Spring to build and use. In CIAS, students from the Computer Graphics Design, 3D Digital Design, and Industrial Design programs will collaborate with students from KGCOE in the ME, EE and CE departments. Each quarter will be a cluster of colleges.

Course Work
From CIAS, these students will be participating in the project in an Experimental Digital Workshop. From KGCOE, these students will be participating in Multidisciplinary Senior Design.

Anticipated impact on teaching and/or learning
By showcasing innovative design and implementation skills of students from these two colleges to the general public, including prospective students, parents visiting campus, and members of our larger community, this project will provide a public display of how collaboration between different disciplines works at RIT.

Students will be directed and evaluated through course work (i.e. through KGCOE Multidisciplinary Senior Design and Senior/Grad Design Studies). One of the primary goals of the project is to help design and engineering students better understand how to work collaboratively together on a team. The faculty involved envision this as a pilot project for a future collaborative pair of courses where engineers and designers work together to conceive, design, and implement projects in teams. The approaches these two groups of students take to problem solving tends to differ. By bringing their practical and imaginative minds together we hope to see growth in both groups.

Impact on teaching and/or learning
Offer a creative solution that will be used by and inspire other students on campus. Motivate freshman and sophomores from CIAS and KGCOE colleges to participate in future collaborations.

How will your project impact student success (i.e., retention)?
Illustrate to freshman and sophomores the capabilities of upper class designers and engineers. Motivate them to seek out similar creative/innovative experiences.

Measure the impact, report findings, and project in a faculty forum.
Since this is part of the KGCOE Multidisciplinary Senior Design requirement, students will deliver course deliverables and these documents will be placed on EDGE website. This design will be open sourced for future exploration or continued development. All Senior Design teams create posters. The project itself and the posters will be displayed at Imagine RIT. Project is intended for display on campus in an open area.

Rationale and Relevance for project.
This project offers an example to students and faculty of the accomplishments which are possible when we bring colleges and ideas together. The project contributes to the on-coming impetus on collaborations that transcend college and departmental boundaries. This project is intended to be a test to bed to generate future student ideas and consider creative solutions during and after completion. The goal will be to provide all documents related to the project as an open source so it is “owned” by the students and faculty as a basis for the development of further ideas and modifications.
Timetable
1. Fall quarter 2010, the project begins with in depth research, brainstorming, concept development and feasibility analysis as we build the implementation team. This project will be defined in collaboration between the Design students and the Engineering students.
2. Winter and Spring 2010, Engineering students will develop the engineering concept, design, build and test the hardware.
3. In Spring, while the hardware is being refined and tested, Design students will develop images, patterns, and designs to be implemented within the system.
4. In the future, we would like the system to be installed outdoors for all to see. Students can be encouraged to develop additional images, enhancements, and applications for the system. The design may generate other project ideas which can be designed an implemented by future students.